

No.: DMRC/Civil/O&M/Dy.CE/C&S-VI /NGT

Date: 23.10.2023

NOTE

Sub : Hon'ble NGT Order Dated 24.07.2023 for O.A. No. 263/2022 (Sh. Harpal Singh Rana V/s Delhi Metro Rail Corporation & Ors).

With reference to above subject the nominated committee has made report which is enclose herewith. May be forwarded to Legal cell for onward submission to Hon'ble Court.

Janhvi
23-10-23
Dy. CE/C&S-VI

ED/CIVIL/O&M

25/10/23

GM/Legal

Kindly examine

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Sharma
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महाप्रबंधक/विधि
GM/LEGAL
दिनांक
Dt. 25/10/23
संख्या
No. 2649

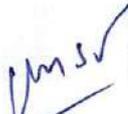
TECHNICAL REPORT OF COMMITTEE AS PER
HON'BLE NGT TRIBUNAL ORDER DATED 24.07.2023
for O.A. No. 263/2022 (Sh. Harpal Singh Rana V/s Delhi
Metro Rail Corporation & Ors.)

1. Objective:

Delhi Metro Rail Corporation Ltd (DMRC) has constructed various lines for movements of passenger as part of mass rapid transit system. Significant part of these metro lines is running as elevated viaduct/bridge. These bridges are serving as catchment area of rainwater.

Honorable NGT vide order dated 24.07.2023 for O.A. No. 263/2022 (Sh. Harpal Singh Rana V/s Delhi Metro Rail Corporation & Ors.) had constituted a joint Committee consisting representatives from:

- (i) Public Works Department, Delhi
- (ii) Municipal Corporation of Delhi;
- (iii) DMRC and
- (iv) Delhi Pollution Control Committee


 (Rajpal Singh)
 SE / PWD


 (K. KUMAR)
 Envt Engrg (DCC)


 17.10.23
 (B.N. Chaturvedi)
 Dy. CE / CBS-VI


 23/10/23
 R.P. SHARMA
 EB (MCD)

and directed them to have a technical report with the help of technical officers for developing a methodology/engineered structured modal to reuse the water for plantation, water into barrage pass or recharging the groundwater and applying it to all such pillars.

2. Committee Members:

In accordance to above direction of Hon'ble NGT, following officers have been nominated to constitute a technical committee.

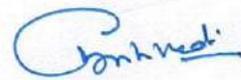
- | | | |
|-------|--|------|
| (i) | Sh Rajpal Singh Shiverain, SE (South West) | PWD |
| (ii) | Sh R P Sharma, Executive Engineer | MCD |
| (iii) | Sh B N Chaturvedi, Dy CE/C&S-VI | DMRC |
| (iv) | Sh K Kumar, Eenvt. Engg. | DPCC |

3. Site Conditions

- Major part of elevated Delhi metro lines is over median of the roads.
- Effective infiltration of water into the soil has not reduced due to construction of these lines as previously Kaccha area has not been converted into paved/concrete area during construction of these





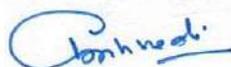
lines. Rainwater before construction of these lines was falling over the road and median of the road.

- Rainwater falling over metro track bed is being discharged through conduits, on piers connected with track bed, in the median of the road. The median is usually consisting the vegetation/plant/horticulture and this water fed evapotranspiration need of these plants. Remaining water percolates in the soil and excess water goes into storm water drain.
- However, at few locations, this system has few flaws such as direct discharge of water over the road due to misalignment of drain pipes, absence of plants/horticulture, presence of interlocking tile flooring etc. on the median of the road.

4. Technical Constraints to provide RWH system in running Line:

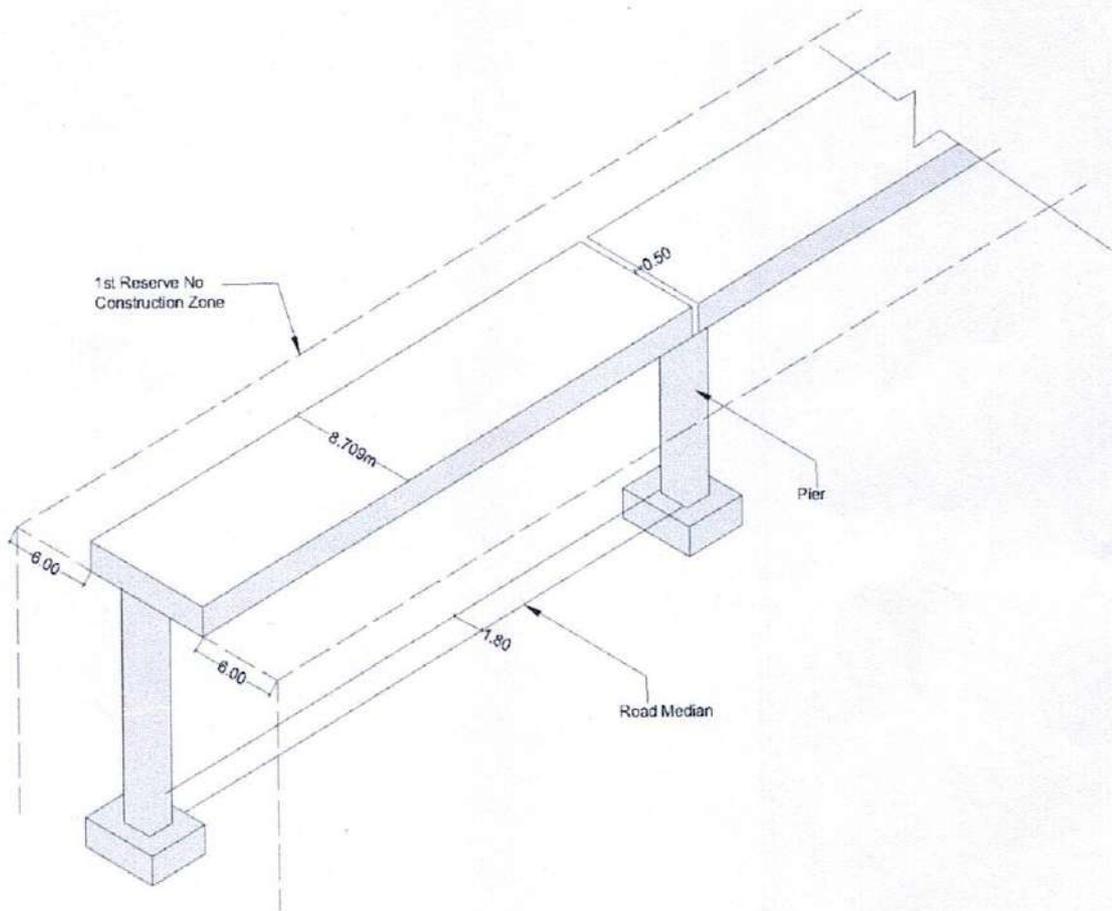
- To safeguard the metro structures from any settlement/damage and to ensure structural safety, DMRC has made a draft code of practice which is being followed for allowing any work near the influence zone of metro structures. A copy of the draft code of practice is enclosed as Annexure A.
- As per DMRC's code of practice, Chapter 3, clause 10 (1), area at a distance of 6m from the outer most edge of the viaduct /at grade structure of the Delhi Metro alignment has been considered as 1st reserve lines (Annexure A1, page-48). Chapter 4, clause 21 (1) - table





2, 21 (5) and 21(6) prohibits any construction / excavation or boreholes in this zone to ensure safety of DMRC structures.

SKETCH SHOWING 1st RESERVE



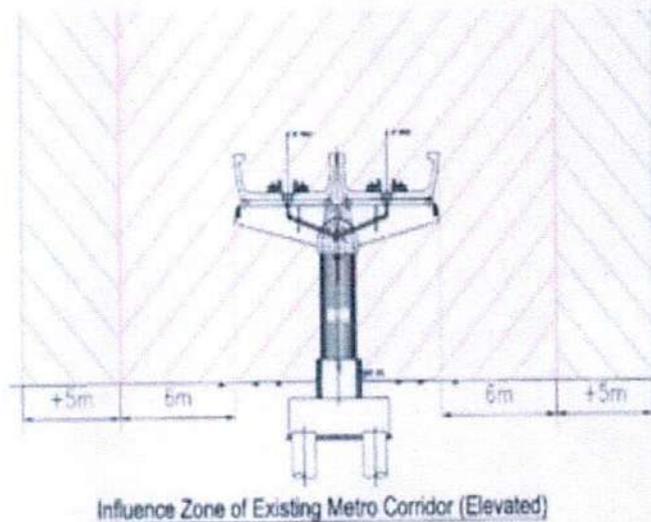
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Legends	
	1st Reserve Line
	2nd Reserve Line
	1st Reserve
	2nd Reserve



- RWH construction will require excavation/construction and bore holes at each pier in the zone of 1st reserve. Hence, this is a safety concern for metro structures.

5. Analysis of RWH for Metro alignment-

- Rainwater Harvesting system is generally designed for collection and storage of rainwater that runs off from roof tops, parks, roads open grounds, etc. This water run off can be either stored or recharged into the ground water.
- Size of RWH system depends on the roof top area (catchment area), runoff coefficient for roof top/concrete area and average maximum rainfall intensity in meters per hour.

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- It is considered that 20% of the rainwater that falls on a rooftop evaporates or is absorbed by the concrete. The balance 80% flows as runoff. So runoff coefficient is 0.80 for concrete surface.
- 25 millimeters (0.025 meter) is the average maximum rainfall that falls in an hour over 1 square meter area in Delhi.
- Capacity/size of RWH system
= Rooftop area (in sqm) X runoff coefficient for roof top/concrete surface X average maximum rain fall intensity in meters per hour

For 100 sqm roof top area-

Size of RWH system = $100 \times 0.8 \times 0.025 = 2.0$ cum (This is in line with DJB's guidelines for calculation of capacity of Rainwater harvesting system.)

- Average span length in metro alignment is around 28-meter. Track bed width of standard gauge line is 8.709 meter. Therefore, catchment area of a span
= $28 \times 8.709 = 243.852$ sqm.
- Capacity /size of RWH required for this catchment area
= $243.852 \times 0.8 \times 0.025$
=4.877 cum

So, RWH of capacity 5 cum is required in every span.

- **The capacity of 5 cum is generally available in the central median as given below.**

Average width of central median = 1.8 meter




Length of catchment available in median after deduction of piers
1 m at each end = 26 meter

Depth of median from kerb stone top level = 0.110 meter

Capacity available in central median = $1.8 \times 26 \times 0.110 = 5.15 \text{ cum.}$

- Therefore, median having approximate effective depth of 110 mm can store the runoff water and recharge the ground water and no additional pit is required.

6. Recommendations

In view of above following is submitted-

- (1) There is a safety concern of DMRC structure for making any pit/boreholes in the 1st Reserve.
- (2) From above calculations, it is found that capacity is available in median to store the rainwater hence no additional pit is required in the span of metro alignment. It is economical to maintain the natural system.
- (3) Average depth of around 110 mm or equivalent above soil should be ensured in central median to behave as storage for rainwater coming from metro deck.
- (4) Central median should not be covered with paver/concrete, wherever feasible to allow infiltration of water in subsoil.
- (5) Horticulture/vegetation (small height plants), wherever feasible, should be developed in central median having high seasonal water requirement.

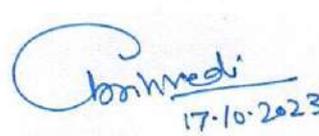
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A handwritten signature in blue ink is located above the name 'C. B. Mehra', which is written in blue ink.

- (6) Pier down take pipes should not be towards road side. It should be ensured that runoff through drainage pipes should fall in the central median.


(Rajpal Singh Shiverain)
17/10/23
SE (South West), PWD


(R P Sharma)
23/10/2023
Executive Engineer, MCD


(B N Chaturvedi)
17-10-2023
Dy CE/C&S-VI, DMRC


(K Kumar)
Environment. Engg, DPPC

GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS

NOTIFICATION

New Delhi, the , 2021

----- In exercise of powers conferred by section 18, section 19, section 20, section 21 and section 44 of the Metro Railways (Construction of Works) Act, 1978, the Central Government hereby makes the following rules for regulating the works/activities in the influence zone of the Delhi MRTS, namely:-

CHAPTER I
PRELIMINARY

1. Short title and Commencement of the Rules —

- (1) These rules may be called the Code of Practice, 2021.
- (2) These rules shall come into force on the date of their publication in the Official Gazette.

2. Scope -

- (1) This Code covers:
 - (i) Construction Reference Plan (CRP) of the DMRTS alignment. The information on the CRPs is indicative only. Updated details and exact location of the rapid transit system structures must be viewed at <http://www.Delhimetrorail.com/disclamier-influence.aspx> and further needs to be verified at site.
 - (ii) Details of Prohibited/Restricted activities which when carried out in the vicinity of the DMRTS alignment (the existing/planned DMRTS structure) may alter the structural and operational requirements of the Delhi Metro Rail Transit System.
 - (iii) The submission procedure and requirement for obtaining the approval for development and building proposals, the permit to commence engineering works and the clearance for the release of certificate of statutory completion for works in the DMRTS influence zone.
 - (iv) Application forms for obtaining permission/ NOC under Chapter IV of The Metro Railways (Construction of Works) Act, 1978 from DMRTS before the commencement of restricted activities on site.
 - (v) Guidelines for Carrying out Restricted Activities within DMRTS influence zone.

3. Definitions And Interpretation -

- (1) In the following document, the words and expressions defined below shall have the meanings assigned to them, except where the context requires otherwise. Words indicating persons or parties include corporations and other legal entities except where the context requires otherwise.

- (i) CRP: Construction reference plan, which shows the location of DMRTS network on google map.
- (ii) METRO: Metro rail transport system refers to the entire system of Delhi Metro Rail network.
- (iii) NOC: No objection certificate, which needs to be obtained from Delhi Metro Rail Corporation before commencement of any work.
- (iv) Influence Zone: The area in the vicinity of DMRTS structures under which any construction activity can affect the integrity of DMRTS.
- (v) Reserve lines: Depending on the distance, the influence zone is divided in different boundaries separated by line(s) known as reserve line(s); area near the DMRTS is divided into 1st reserve and 2nd reserve as shown in Annexure A1 to A4.
- (vi) Competent Authority: The Competent Authority referred herein shall be CE/General Delhi Metro Rail Corporation Limited.
- (vii) Deemed to Satisfy: If all the technical requirements mentioned in chapter 5 of this code are fulfilled, then that proposal is known as deemed to satisfy provision.
- (viii) Professional Engineer (PE): A professional Civil Engineer, who is well versed with the structural design of the DMRTS and can develop the construction proposal.

4. Objectives And Performance Requirements

While submitting a proposal for NOC to a work/activity in the influence zone of DMRTS, it is to be ensured that the proposal fulfills all the 5 objectives mentioned in sub-section 1 below. These objectives define the basic criteria that need to be satisfied to ensure safety of the DMRTS. To meet these objectives, performance requirements have been spelt out which assist the developer in working out the suitable solutions using the appropriate assessment methods in designing and executing any development works.

How to develop any solutions:

The objective guides the designer to interpret the requirements mentioned in deemed to satisfy provisions. Performance requirements outline the areas that need to be considered to achieve the objectives. All solutions must comply with the objectives and the performance requirements. Solutions developed to meet the deemed-to-satisfy provisions will meet the performance requirements.

(1) Objectives

- Structural safety
- Operational safety
- Fire safety
- Flood protection
- Inspection and maintenance

Developers must meet the objectives mentioned above in designing and executing any development and building works; including associated works such as advance works and temporary works for the protection of the DMRTS.

(2) Performance Requirements

(i) Structural Safety

The objectives are to ensure that, in designing and executing any development and building works, they do not create a situation that would damage or affect the integrity of the DMRTS structures. For ensuring that a qualified person or an expert should fully understand the design of the DMRTS structures, their present condition and the effects of the development and building works on the DMRTS structures due to the proposal.

(ii) Operational Safety

The DMRTS tunnel and track alignment must not be subjected to excessive deformation and changes. If the design limits are exceeded, there will be a possibility that the train would not be able to travel at the optimum speed, the comfort of passengers may be affected or in the worst scenario cause train to derail.

(iii) Fire Safety

During development and building works, especially where works may affect the means of escape from the station, adequate fire safety measures and protection systems must be provided.

(iv) Flood Protection

Any underground links to the DMRTS structures, services connections, etc., during construction or permanent stage must not subject the rapid transit systems to any risk of flooding.

(v) Inspection and Maintenance

Development and building works around, above and in the vicinity of the DMRTS must not cause obstruction or inaccessibility for the inspection and maintenance of the rapid transit systems.

CHAPTER 2 REFERENCE PLAN

5. The CRP of the DMRTS alignment is provided herewith for reference and information on the Google plans is indicative only. Updated details and exact location of the DMRTS must be viewed at <http://www.Delhimetrorail.com/disclamier-influence.aspx> and further needs to be verified at site prior to applying for NOC.

6. As on date, there are overall 10 stretches of DMRTS which are operational. The same are mentioned as follows:

- Line 1 (Red line) - RITHALA TO NEW BUS ADDA
- Line 2 (Yellow line) – SAMAYPUR BADLI TO HUDA CITY CENTER
- Line 3 (Blue line)- NOIDA ELECTRONIC CITY TO DWARKA SECTOR-21
- Line 4 (Blue line) - YAMUNA BANK TO VAISHALI
- Line 5 (Green Line)- INDERLOK KIRTI NAGAR TO BRIGADIER HOSIAR SINGH
- Line 6 (Violet Line) - KHASHMERE GATE TO RAJA NAHAR SINGH
- Line 7 (Pink Line)- MAJLIS PARK TO SHIV VIHAR
- Line 8 (Magenta Line)- JANAKPURI WEST TO BOTANICAL GARDEN
- Line 9 (Grey Line)- DWARKA TO DHANSA BUS STAND
- Airport Express Line

7. In addition, the proposed alignment for the Phase-4 of DMRTS has also been finalized and maybe viewed at <http://www.Delhimetrorail.com/disclamier-influence.aspx>:

- PHASE 4

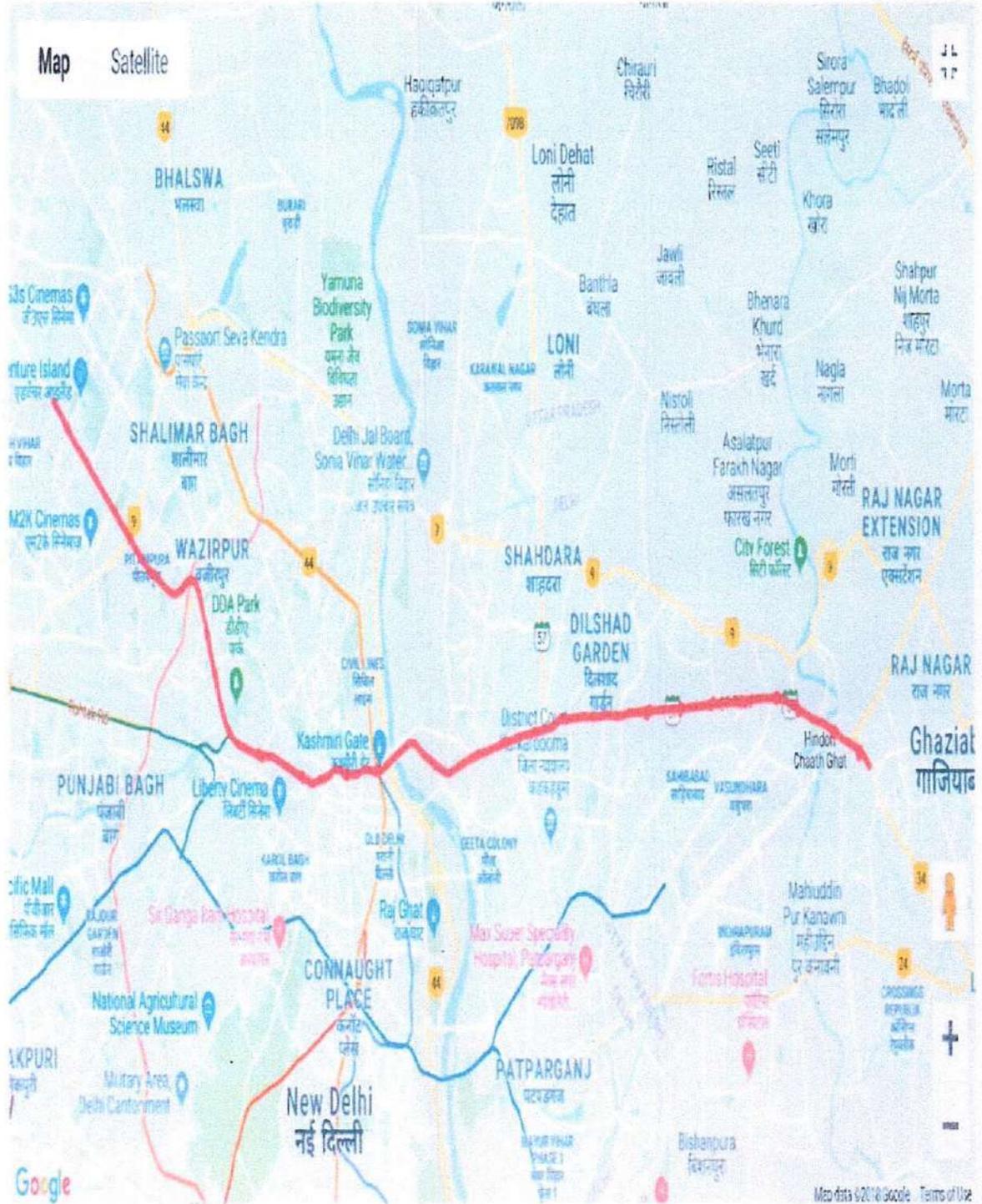
8. **Influence Zone**

The influence zone of the above corridors is provided below for the purpose of reference only. The exact location and updated influence zone must be viewed at <http://www.Delhimetrorail.com/disclamier-influence.aspx> and further needs to be verified at site prior to applying for NOC.

(1) Rithala To New Bus Adda Corridor (Line-1/Red Line):

For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/LINE-1-RITHALA-TO-NEW-BUS-ADDA.html>



(2) Samaypur Badli To Huda City Centre Corridor (Line-2/Yellow Line):

For details and enlarged view, visit

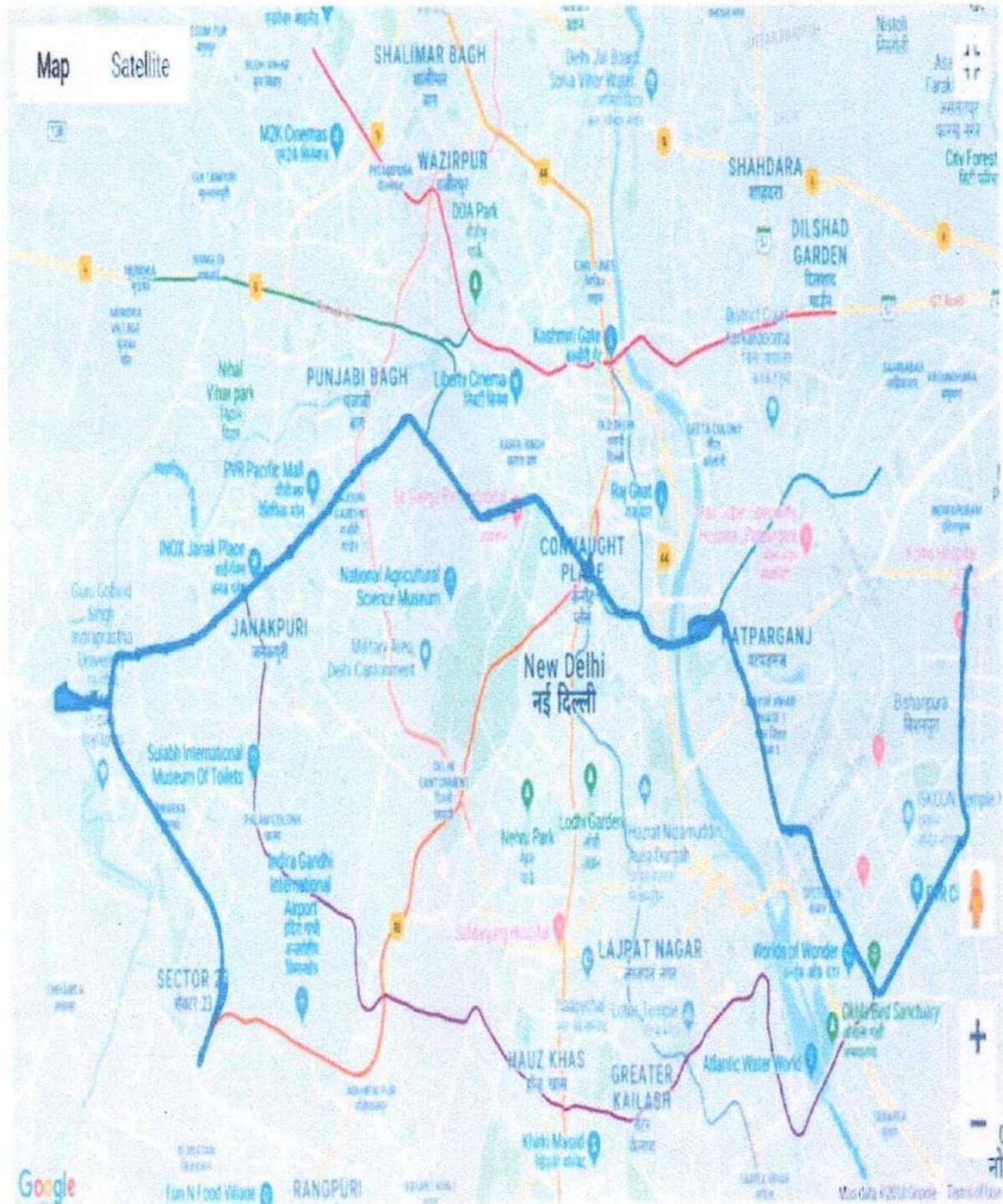
<http://www.Delhimetrorail.com/KML/LINE-2-BADLI-TO-HUDA-CITY-CENTER.html>



(3) Noida To Dwarka Sector-21 (Line-3/Blue Line):

For details and enlarged view, visit

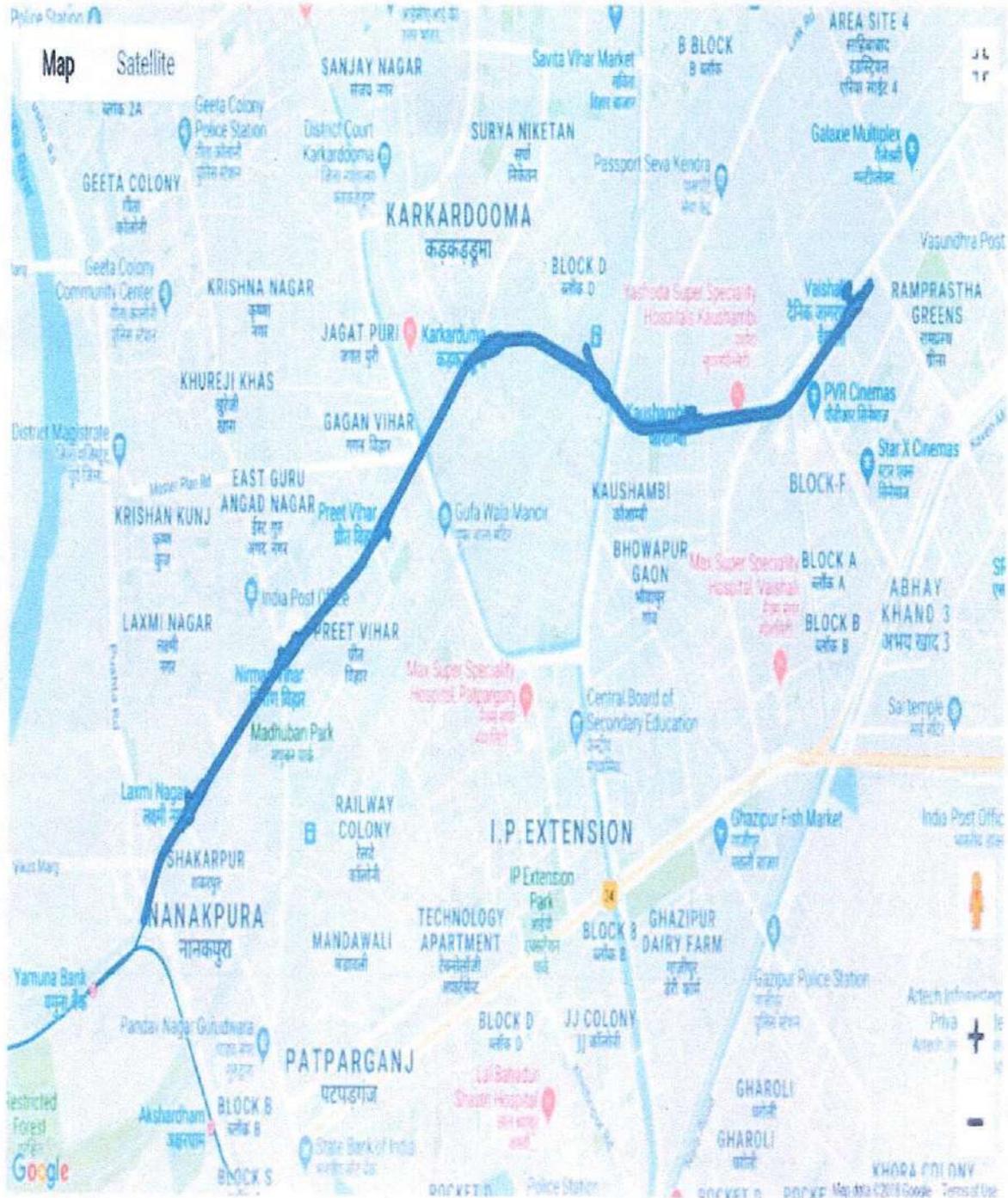
<http://www.Delhimetrorail.com/KML/LINE3-NOIDA-TO-DWARKA.html>



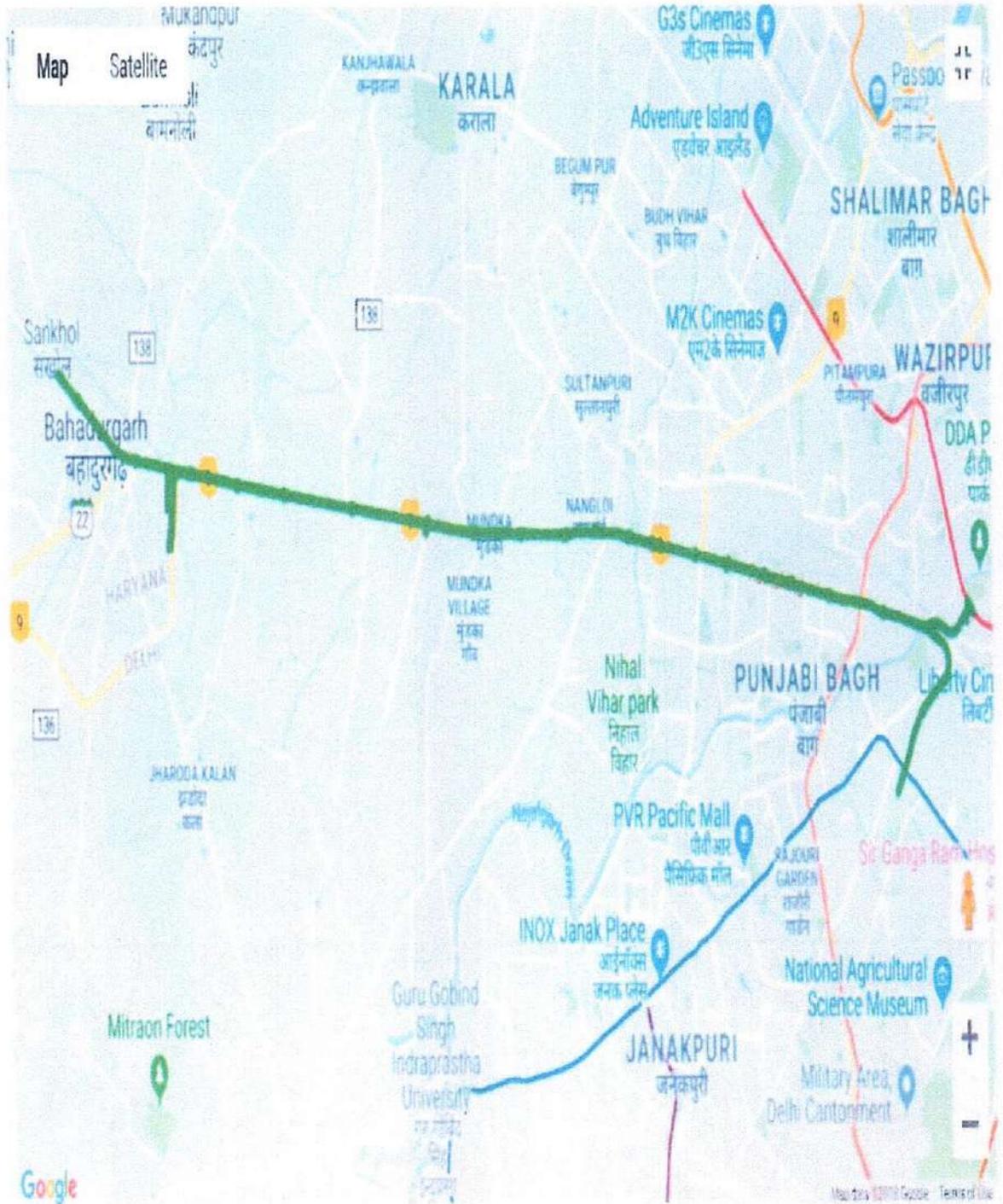
(4) Yamuna Bank To Vaishali Corridor (Line-4/Blue Line):

For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/LINE-4-YAMUNA-BANK-TO-VAISHALI.html>



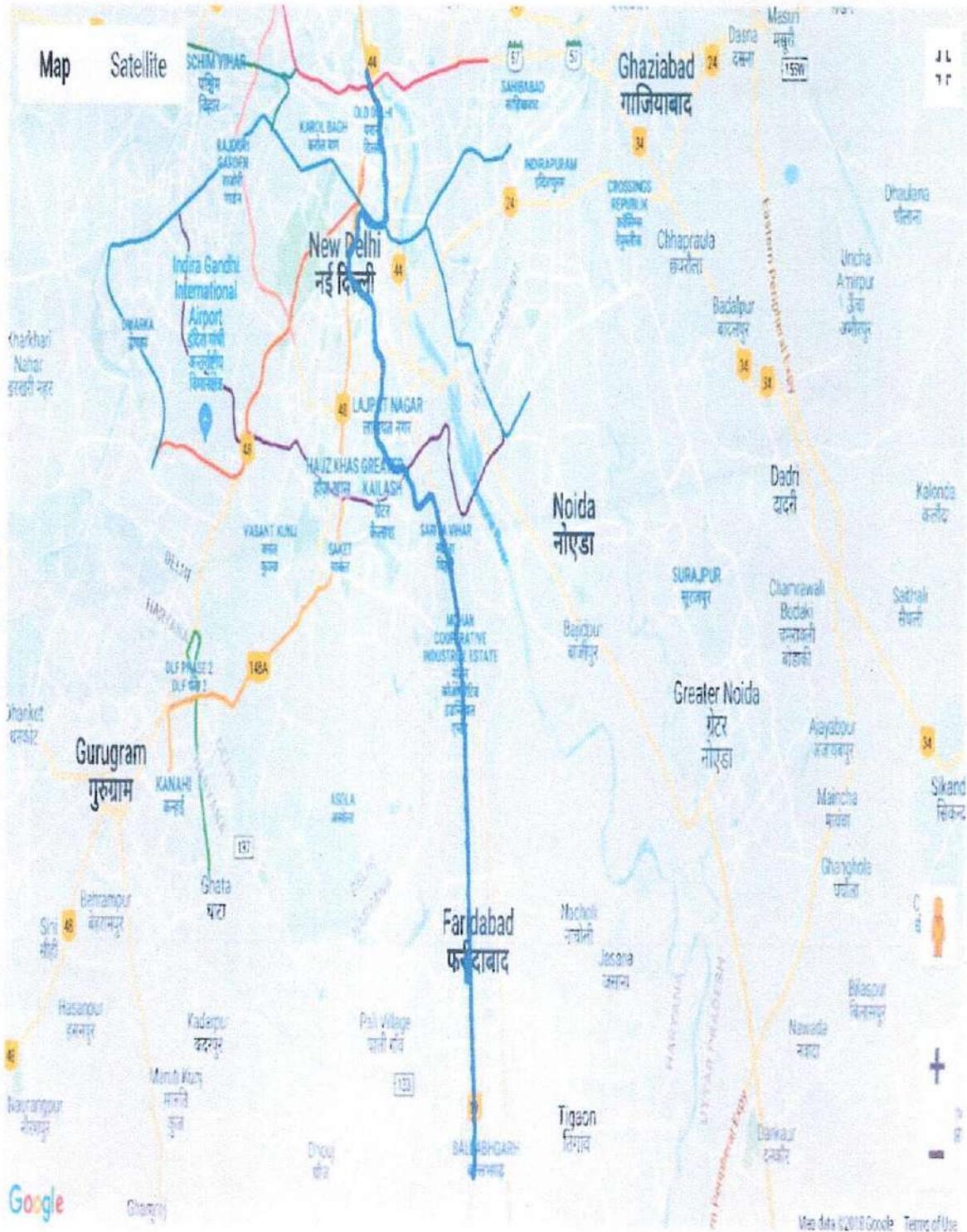
- (5) Kirti Nagar/Inderlok To Bahadurgarh Corridor (Line-5/Green Line):
 For details and enlarged view, visit <http://www.Delhimetrorail.com/KML/LINE-5-INDERLOK-TO-BAHADURGARH.html>



(6) Kashmere Gate To Ballabgarh Corridor (Line-6/Violet Line):

For details and enlarged view, visit

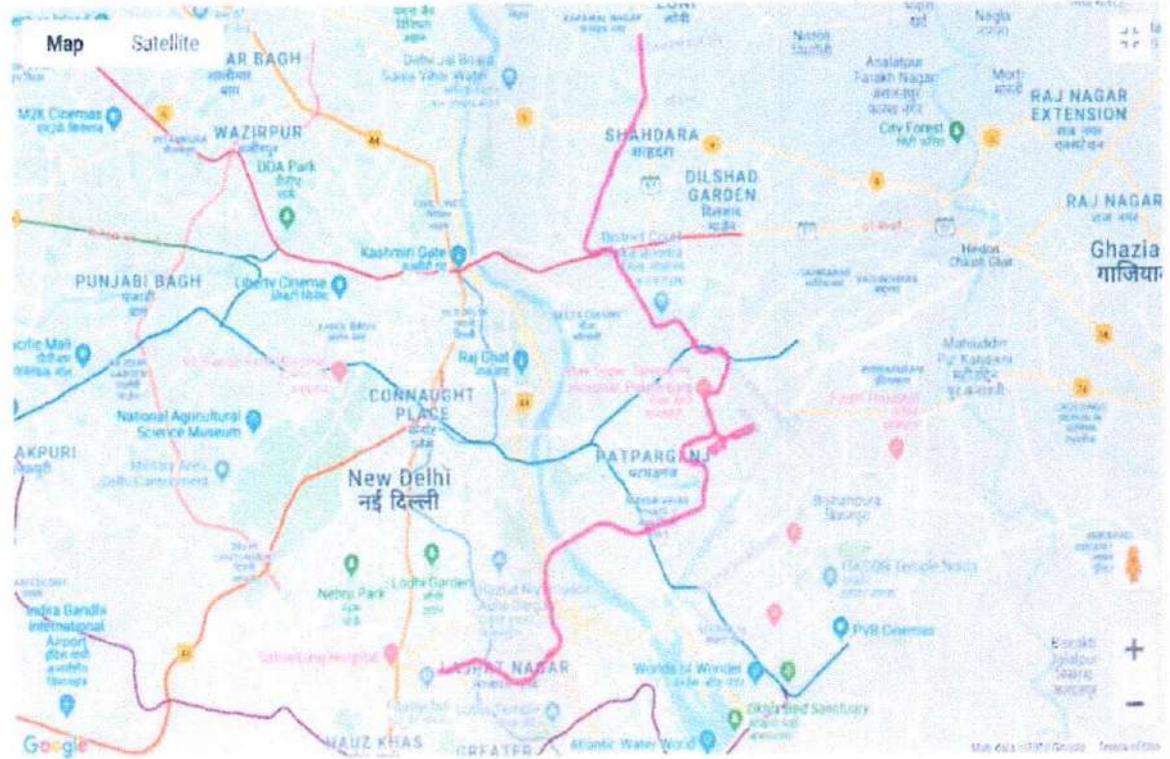
<http://www.Delhimetrorail.com/KML/LINE-6-KHASHMERE-GATE-TO-BALLABHGARH.html>



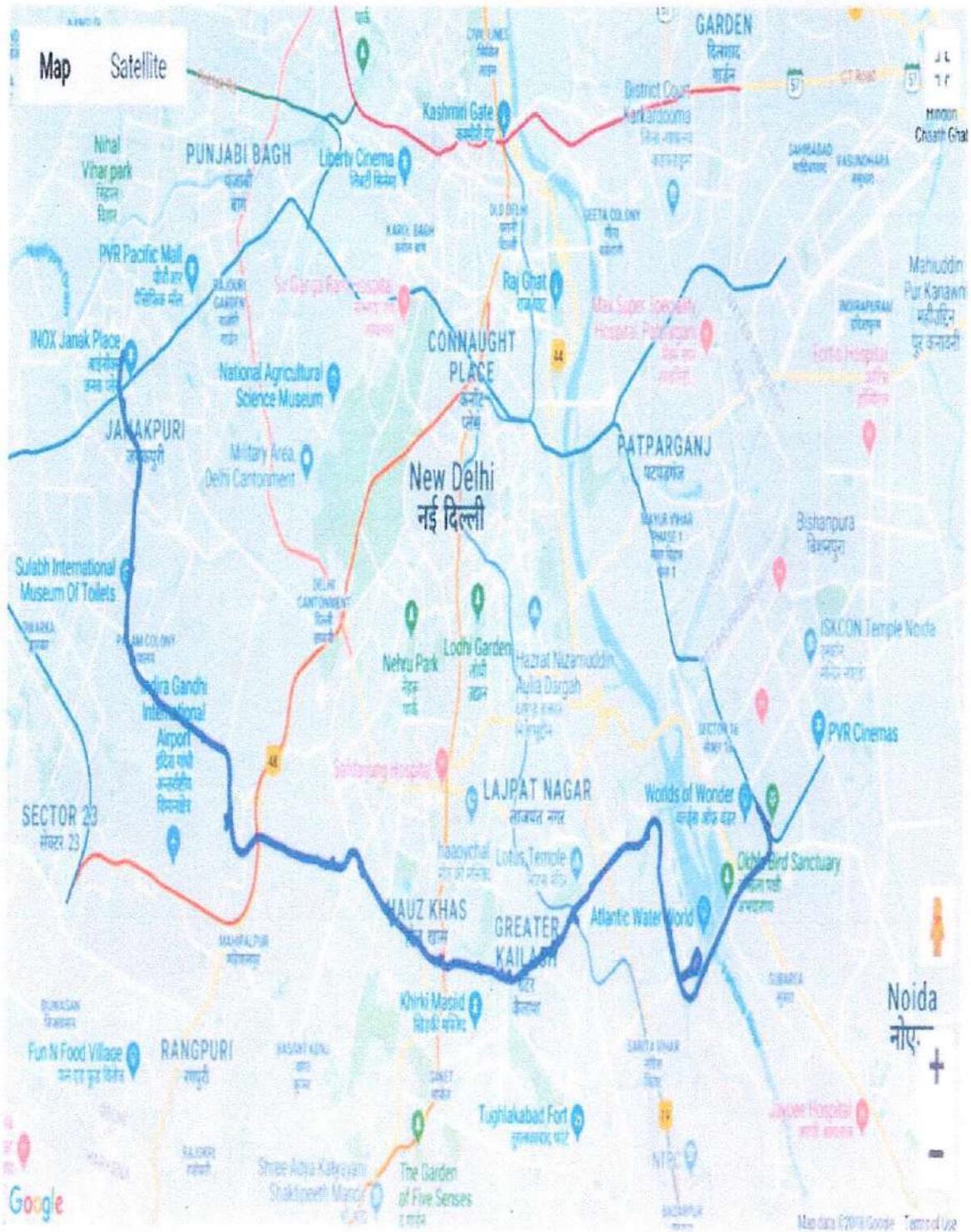
(7) Maljis Park To Shiv Vihar Corridor (Line-7/Pink Line):

For details and enlarged view, visit

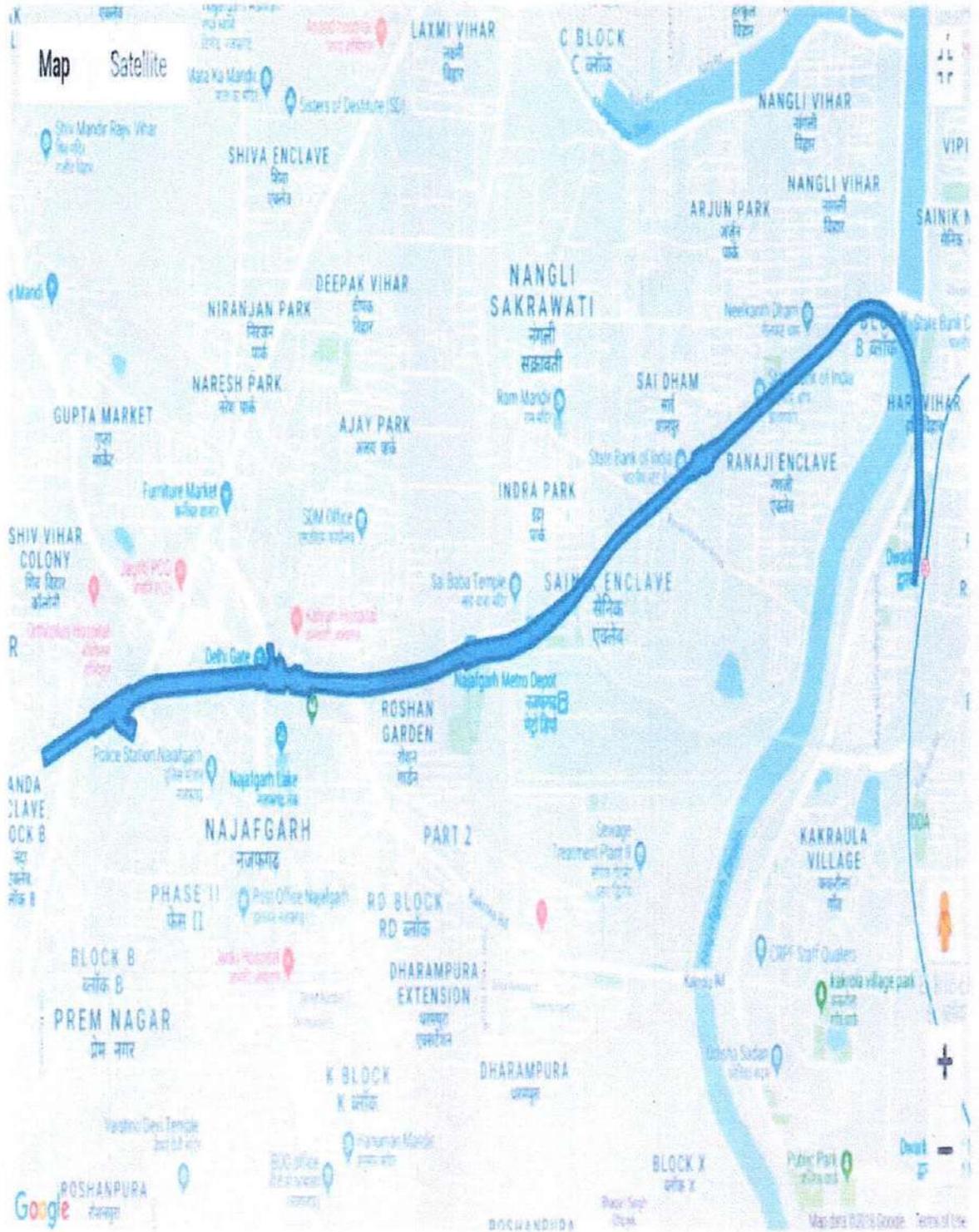
<http://www.Delhimetrorail.com/KML/LINE-7-MUKUND-PUR-TO-SOUTH-EXT.html>



- (8) **Janakpuri West To Botanical Garden Corridor (Line-8/Magenta Line):**
For details and enlarged view, visit
<http://www.Delhimetrorail.com/KML/LINE-8-JANAKPURI-TO-BOTANICAL-GARDEN.html>



- (9) Dwarka To Dhansa Bus Stand (Line-9/ Grey Line):
For details and enlarged view, visit
http://delhimetrorail.com/KML/Dwarka_Dhansa.html



(10) Airport Express Line (Orange Line):

For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/AIRPORT-LINE1.html>



(11) DMRTS Phase 4 Alignment:

The proposed alignment of Phase-4 of DMRTS consists of 6 new corridors which are as follows:

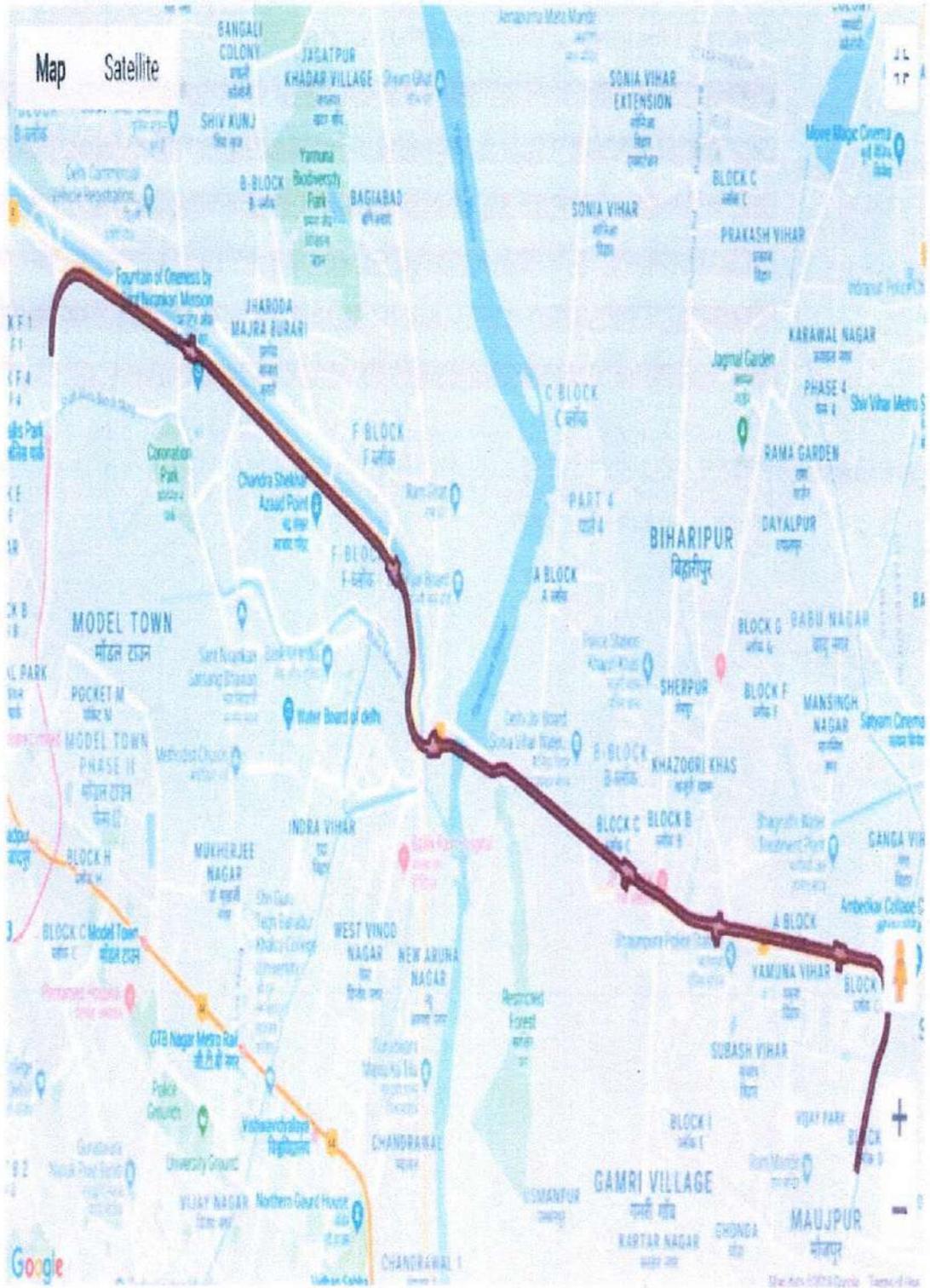
DMRTS Line - INFLUENCE ZONE OF DMRTS (FOR NOC) - PHASE 4

- MAUJPUR TO MAJLIS PARK
- RITHALA BAWANA NARELA
- RK ASHIRAM MUKUNDPUR JANAK PURI
- INDERLOK TO INDRAPRASTHA
- TERMINAL 1 - IGI AIRPORT TO TUGHILAKABAD
- LAJPAT NAGAR TO SAKET G-BLOCK

The influence zone of the above corridors is as proposed and is being provided below for the purpose of reference only. The exact location and updated influence zone must be viewed at <http://www.Delhimetrail.com/disclamier-influence.aspx> and further needs to be verified at site prior to applying for NOC.

- (i) Maujpur – Majlis Park Corridor (Line – 7/ Pink Line Extension):
For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/PHASE-4/Yamuna-vihar-Mukundpur.html>

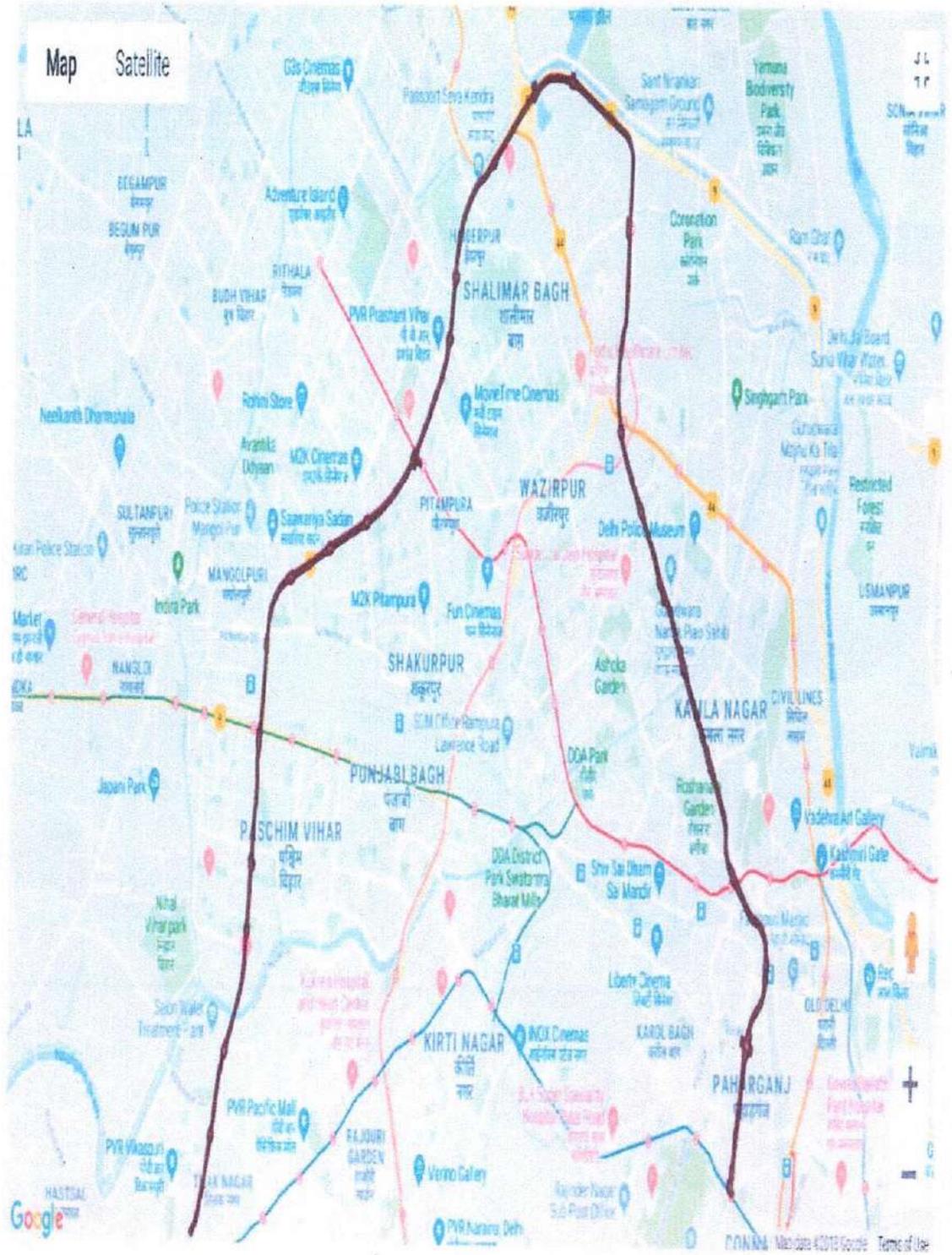


(ii) Rithala-Bawana-Narela Corridor (Line – 1 Extension):

For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/PHASE-4/ROHINI-TO-NARELA.html>

- (iii) R K Ashram-Mukundpur-Janakpuri Corridor (Line – 8/ Magenta Line Extension):
For details and enlarged view, visit <http://www.Delhimetro rail.com/KML/PHASE-4/RK-ashram-to-MunkundPur.html>



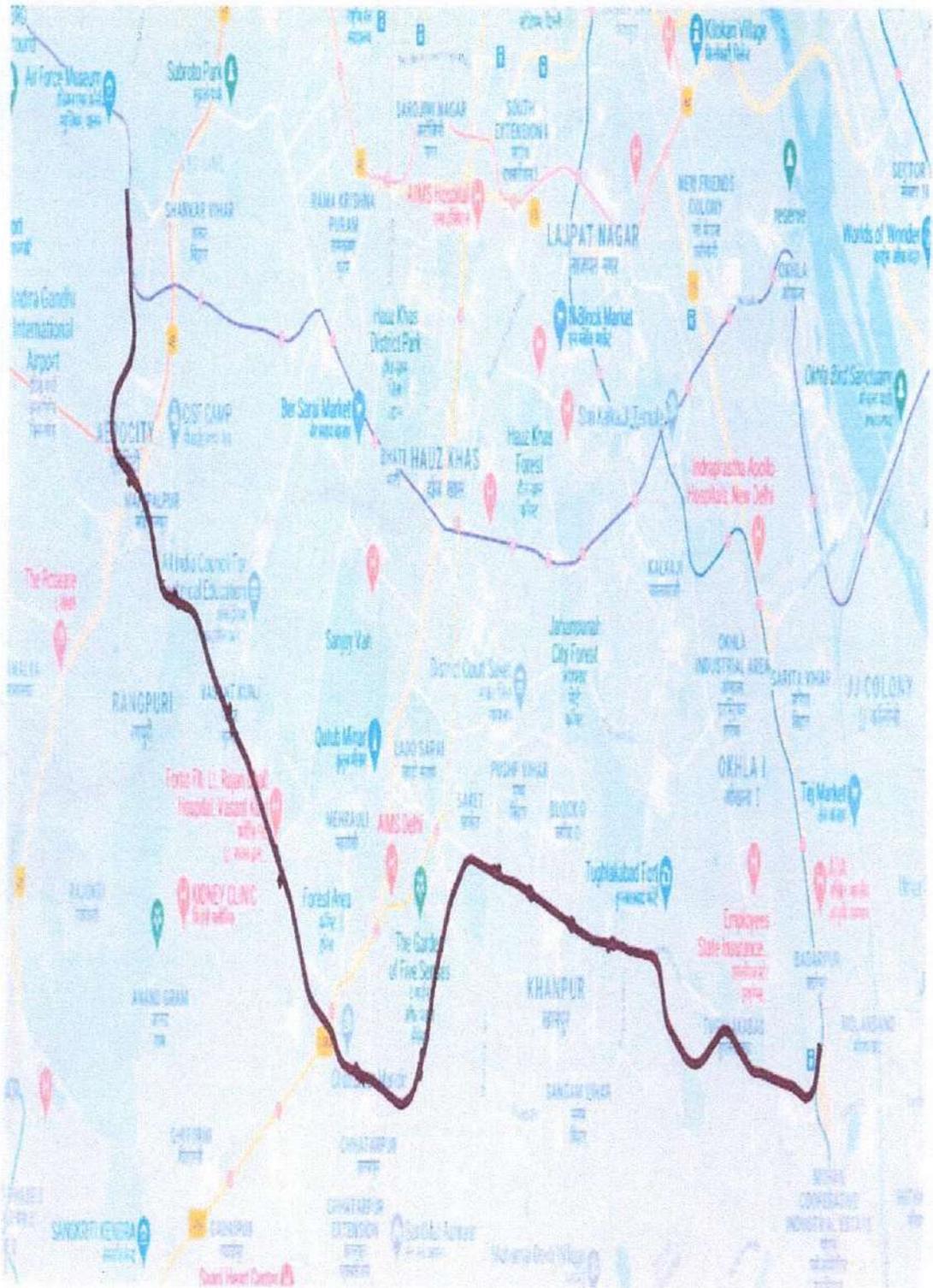
(iv) Inderlok-Indraprastha Corridor (Extension of Line – 5):

For details and enlarged view, visit

<http://www.Delhimetrorail.com/KML/PHASE-4/Inderlok-to-indraprastha.html>



- (v) **Terminal 1 – IGI Airport – Tughlakabad Corridor (Line – 10/ Silver Line):**
 For details and enlarged view, visit
<http://www.Delhimetro.com/KML/PHASE-4/Domestic-airport-to-Tughlakabad.html>



(vi) Lajpat Nagar – Saket G-Block Corridor:

For details and enlarged view, visit

<http://www.Delhimetro-rail.com/KML/PHASE-4/Lajpat-Nagar-to-Chattarpur.html>



CHAPTER 3
RESTRICTIONS IN METRO INFLUENCE ZONE

9. **Introduction**

This section deals with the various reserve boundaries defined by this code and the scope of restrictions/prohibitions applying to construction/development activities intended to be undertaken in the influence zone of these reserve boundaries hereinafter referred as 'RESERVE LINES'.

Subsequently, any person intending to carry out restricted activities in the influence zone shall be required to obtain NOC from the Competent Authority of DMRC before commencement of work on site.

10. **Reserve Lines**

The reserve lines are the boundaries that divide the 'Influence Zone' into 2 different zones based on their proximity from the edge of the DMRTS structure. The nearest zone has been termed as 1st reserve followed by 2nd reserve.

(1) For Existing Elevated / At Ground Structure:

- (i) 1st Reserve Line : 1st Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 6m from the outermost edge of the viaduct/at grade structure of the DMRTS alignment. The area between the 1st reserve lines is denoted as 1st Reserve. (ref. annexure A1)
- (ii) 2nd Reserve Line : 2nd Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 1st reserve line+5m from the outermost edge of the viaduct/at grade structure of the DMRTS alignment. The area between the 1st Reserve Line and the 2nd Reserve Line, on either sides of the structure, is denoted as 2nd Reserve. (ref. annexure A1)

(2) For Existing Underground Structure:

- (i) 1st Reserve Line : 1st Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 6m or 1D (D – is outer dia. of tunnel), whichever is greater, from the outermost edge of the tunnel lining/station box of the DMRTS alignment. The area between the 1st reserve lines is denoted as 1st Reserve. (ref. annexure A2).
- (ii) 2nd Reserve Line : 2nd Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 1st reserve line+5m from the outermost edge of the tunnel lining/station box of the DMRTS alignment. The area between the 1st Reserve Line and the 2nd Reserve Line, on either sides of the structure, is denoted as 2nd Reserve. (ref. annexure A2).

(3) For Proposed Elevated/At Ground Structure (Future):

- (i) 1st Reserve Line : 1st Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 6m from the outermost edge of DMRTS alignment. The area between the 1st reserve lines is denoted as 1st Reserve. (ref. annexure A3).
- (ii) 2nd Reserve Line : 2nd Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 1st reserve line+14m from the outermost edge of DMRTS alignment. The area between the 1st Reserve Line and the 2nd Reserve Line, on either sides of the structure, is denoted as 2nd Reserve. (ref. annexure A3).

(4) For Proposed Underground Structure (Future):

- (i) 1st Reserve Line : 1st Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 9m or 1.5D (D – is outer dia. of tunnel), whichever is greater, from the outermost edge of the tunnel lining/station box of the DMRTS alignment. The area between the 1st reserve lines is denoted as 1st Reserve. (ref. annexure A4).
- (ii) 2nd Reserve Line : 2nd Reserve line is defined as the two-dimensional line (vertical & horizontal) at a distance of 1st reserve line+11m from the outermost edge of the tunnel lining/station box of the DMRTS alignment. The area between the 1st Reserve Line and the 2nd Reserve Line, on either sides of the structure, is denoted as 2nd Reserve. (ref. annexure A4).

11. **Restricted Activities**

Prior permission is required from DMRC before commencement of any work in metro influence zone. The activities carried out in the vicinity of DMRTS influence zone which can be dangerous to DMRTS structures and personnel travelling in DMRTS are known as restricted activities.

The types of restricted activities are following:

1. The movement or operation of any crane, whether fixed or mobile, hoist, ladder, drilling or piling equipment, excavator or any other mechanical equipment or vehicle;
2. The installation of boreholes, wells, sheet piles, pile foundations, ground anchors and horizontal tie-backs;
3. The storing or placing or causing or allowing the storage or placement of, any goods, material or thing or any solid, liquid or gaseous matter or substance;
4. The digging or excavation of trenches or pits, the carrying out of earthworks and backfilling, or the shifting or pushing of earth or soil from one area to another, whether or not such activities are carried out manually or by mechanical means;
5. The erection of sheds, shelters, tents, scaffolding, maintenance towers, ladders, hoardings and other similar temporary structures for the purpose of trade fairs, fun fairs, exhibitions, entertainment, night markets, religious functions or ceremonies;
6. The planting of trees with full-grown height extending above the parapet or wing wall of the DMRTS and;
7. The use of explosive material for the purpose of blasting, demolition or removal of rocks.

The deemed-to-satisfy criterion for according the permission to the above activities along with the application process have been briefly mentioned in Chapter 4 (Proposals for Work in DMRTS Influence Zone) of this code. It may further be noted that any works subsequently undertaken in the DMRTS Influence Zone shall be executed only under consideration to the provisions of Chapter 5 (Guidelines to Carry out Restricted Activities within DMRTS Influence Zones).

CHAPTER 4
PROPOSALS FOR WORK IN DMRTS INFLUENCE ZONE

12 Introduction

This section deals with the submission procedure to be followed while applying for NOC to work in the DMRTS Influence Zone. It further elaborates the various 'Deemed-to-Satisfy' Provisions, the compliance of which shall qualify the proposal for NOC from the Competent Authority in a normal scenario.

However, in special cases, where the execution of the proposal is essential such as a Project of National Importance, Urban Planning etc., suitable alternate solution, if possible, may also be suggested by the Competent Authority of DMRC, in view of the design parameters of the adjacent DMRTS alignment.

It is mentioned that all proposals being processed under the revised Transit Oriented Development (TOD) Policy of the Ministry of Housing & Urban Affairs (notified vide Gazette Notification No. S.O. 3063(E) dated 30.07.2021 and made part of modified Master Plan of Delhi, 2021 by Delhi Development Authority) and infringing the notified DMRTS Influence Zone (under this code) shall be requiring NOC from DMRC, however they will be considered under the category of special cases. Further, all such proposals of works related to National Importance, Transit Oriented Development and Monumental Nature shall require to be submitted for NOC from DMRC in the similar manner as mentioned for other works in this code, however the proposal shall additionally be accompanied by an application citing the essential nature of the project so that suitable alternate solution, considering feasibility, will be delved into; to accommodate the project in the DMRTS Influence Zone if the initial proposal submitted by the applicant is unable to clear the 'Deemed-to-Satisfy' Provisions of this code initially.

13 Procedure Layout For Submission

Since the overall NOC for carrying out a project in any specific area of Delhi NCR is provided to the applicant only by the respective civic body (Municipal Corporation/Nagar Palika), the NOC application for working in DMRTS Influence Zone shall be submitted by the applicant to the respective Civic Body.

The application for NOC thus submitted, along with the requisite details and documentation (as mentioned in Section 16, 17, 18, 19 & 20 of this Chapter) shall then be forwarded to the Competent Authority of DMRC for the perusal of the same.

The Competent Authority of DMRC providing the NOC to work in the Influence Zone of DMRTS is CE/General and all the correspondence in this regard shall be made to the Office of the CE/General, DMRC Ltd., Metro Bhawan, Fire Brigade Lane, Barakhamba Road, New Delhi-110001.

A detailed flowchart sequence for according of NOC to work in DMRTS influence zone is annexed along with this code as Annexure-A10 for the reference of all concerned.

14. Timeline for issue of NOC

60 working days from the date when the application has been received.

15 Classification Of Works

The work proposals that may be carried out in the Influence Zone of DMRTS have been divided into following 5 categories:

- (1) Development Works: Development Works are the civil works which are generally dealing with the development of the area in the Influence Zone and do not deal with building construction of any type. e.g. horticulture, utility laying, beautification, pavement laying etc.
- (2) Building Works: Building Works are the structural works proposed to be taken up in the DMRTS Influence Zone. The execution of those works will not affect structural integrity of

the adjacent DMRTS structures in any way. e.g. Construction of a building in line with 'Deemed-to-Satisfy' Provisions of this code.

- (3) Engineering Works: Engineering works refer to any construction works in the Influence Zone of the DMRTS that could affect the structural integrity of the DMRTS structures and the safety of DMRTS operations. e.g. construction of a multi-storied building with a basement over the tunnel alignment of DMRTS.
- (4) Hoisting of crane/mobile or any type tower etc.: All the works that are to be taken up in the DMRTS Influence Zone in which crane/tower is to be set up and that may endanger or is likely to affect the structural integrity of DMRTS structures and the safety of its operation. E.g. mobilization of crawler or tyre mounted crane, erection of tower crane, erection of mobile tower or similar towers etc.
- (5) Erection of billboards/advertisement hoardings etc.: All the works in which billboards/advertisement hoardings are to be set up within the influence zone of DMRTS that may endanger or are likely to affect the structural integrity of DMRTS structures and the safety of its operation. e.g. erection of billboards along the boundary of the construction site, erection of advertisement hoardings, erection of advertisement balloons etc.

16 Submittals For NOC To Development Works

This section stipulates the procedures and requirements for obtaining NOC for a development work proposal in the influence zone of DMRTS.

(1) Preliminary Engineering Assessment

A Professional Engineer (Civil) (hereinafter referred as consultant) who is well versed with the structural design of the DMRTS, should be engaged by the applicant at this stage as a consultant to carry out a preliminary engineering assessment of the effects of the development proposal on the DMRTS. The appointed consultant is encouraged to initiate a consultation meeting with the Competent Authority of DMRC to discuss his proposal before submitting a formal application.

A copy of the engineering evaluation report, accompanied by plans for engineering works, endorsed by the consultant shall be submitted together with the application for the approval of development proposal. For development located close to the rapid transit system structures, the Authority requires the qualified person to submit certified survey plans to assist in the processing of engineering evaluation report.

An application for the approval of development proposal shall be accompanied by the following items:

- (i) Plan for development works;
- (ii) Engineering evaluation report accompanied by plan for engineering works;
- (iii) Certified survey plans.
- (iv) Detailed construction procedure for all the relevant activities.
- (v) Undertaking for crane operation (annexure A8) and submission as per Section 19 of this code, if required.

The Plan for development works shall be prepared in accordance with the applicable law and shall be drawn to a scale of 1:100 or 1:200 or 1:250 generally, except for the site plan which is to be presented in a scale of 1:500. Also, the consultant shall sign on every sheet of the plans. This requirement shall also apply to plans submitted electronically.

The first sheet of the plan shall bear the following declarations undersigned by the consultant: I,.....(name of the consultant), being the qualified person engaged by applicant under Section 16 of the Code of Practice for Working in DMRTS influence zone of DMRTS hereby certify that the development works in the DMRTS Zone have been designed in accordance with the Code of Practice for Working in DMRTS influence zone of DMRTS and the same shall not affect the structural integrity of adjacent DMRTS structures in any ways. Further, it is

certified that the objectives and performance requirements of DMRTS as mentioned in Section 4, 4(1) and 4(2) have been considered and satisfied while preparing the proposal.

(2) Details of Submittal Drawings

The Site and layout plans of the development proposal shall show the following items:

- (i) Scale of plans/sections/elevations;
- (ii) Location and clearances of the proposed development works in relation to the DMRTS structures;
- (iii) First and second reserve lines of the DMRTS structures, where applicable.

(3) Details of Submitted Survey Plans

The Certified survey plans submitted along with the development proposal shall:

- (i) Be endorsed by a registered land surveyor after conducting a physical geometric survey of the relevant sections of the rapid transit system structures
- (ii) Indicate the scale, existing contours, alignments, chain-ages, co-ordinates, levels and reserve lines of the DMRTS structures; and
- (iii) Indicate the boundary lines, plot nos. and the existing structures.

(4) NOC to Proposal for Development Works

The Authority will approve the development proposal in writing if the following requirements are complied with:

- (i) PE has complied with the requirements of Section 16(1) to 16(3) of this code and that all items submitted are found to be in order; and
- (ii) PE has demonstrated and confirmed that it is feasible for the development proposal to fully meet the technical requirements of mentioned in Section 21.

17. **Submittals For NOC To Building Works**

This section stipulates the procedures and requirements for obtaining NOC for a building work proposal in the influence zone of DMRTS.

(1) Preliminary Engineering Assessment

A Professional Engineer (Civil) (hereinafter referred as consultant) who is well versed with the structural design of the DMRTS, should be engaged by the applicant at this stage as a consultant to carry out a preliminary engineering assessment of the effects of the building proposal on the DMRTS. The appointed consultant is encouraged to initiate a consultation meeting with the Competent Authority of DMRC to discuss his proposal before submitting a formal application.

A copy of the engineering evaluation report, accompanied by plans for engineering works, endorsed by the consultant shall be submitted together with the application for the approval of building proposal. For development located close to the rapid transit system structures, the Authority requires the qualified person to submit certified survey plans to assist in the processing of engineering evaluation report.

An application for the approval of building works proposal shall be accompanied by the following items:

- (i) Plan for building works;
- (ii) Drainage Department's clearance letter on the proposed flood threshold levels for all entrances and openings in the development if it is connected or integrated with the rapid transit systems;
- (iii) Engineering evaluation report accompanied by plan for engineering works.
- (iv) Detailed construction procedure for all the relevant activities.
- (v) Undertaking for crane operation (annexure A8) and submission as per Section 19 of this code, if required.

The Plan for building works shall be prepared in accordance with the requirements of the Regulations and shall be drawn to a scale of 1:100 or 1:200 or 1:250 generally, except for the site plan which is to be presented in a scale of 1:500. Also, the consultant shall sign on every sheet of the plans. This requirement shall also apply to plans submitted electronically.

The first sheet of the plan shall bear the following declarations undersigned by the consultant: I,.....(name of the consultant), being the consultant engaged by applicant under Section 17 of the Code of Practice for Working in metro influence zone of DMRTS; hereby certify that the building works in the DMRTS Influence Zone have been designed in accordance with the Code of Practice for Working in metro influence zone of DMRTS and the same shall not affect the structural integrity of adjacent DMRTS structures in any ways. Further, it is certified that the objectives and performance requirements of DMRTS as mentioned in Section 4, 4(1) and 4(2) have been considered and satisfied while preparing the proposal.

(2) Details of Submittal Drawings

The Site and layout plans of the building proposal shall show the following items:

- (i) Scale of plans;
- (ii) Building and boundary lines of building;
- (iii) Location and clearances of the proposed building works in relation to the rapid transit system structures;
- (iv) First and second reserve lines of the DMRTS structures, where applicable;
- (v) Existing ground level;
- (vi) Basement outline, if any;
- (vii) Discharge outlet from pump sump in basement, if any; and
- (viii) Main roads and special landmarks.

The sections and elevations of the development proposal shall show the following items:

- (i) Scale of the plans;
- (ii) Building and boundary lines of building;
- (iii) Horizontal and vertical clear distances between rapid transit system structures and the proposed development;
- (iv) First and second reserve lines of rapid transit system structures, where applicable;
- (v) Depth of basement, if any;
- (vi) Details of proposed drainage system including discharge outlet, if any;
- (vii) Proposed platform level if the proposal is connected or integrated with the DMRTS; and
- (viii) Affected drain lines and lightning protection system of the rapid transit systems.

(3) NOC to Proposal for Building Works

The Authority will approve the building works proposal in writing if the following requirements are complied with:

- (i) The consultant has complied with the requirements of Section 17(1) to 17(2) of this code and that all items submitted are found to be in order; and
- (ii) The consultant has demonstrated and confirmed that it is feasible for the building works to fully meet the technical requirements of Section 21.

18. **Submittals For NOC To Engineering Works**

- (1) As Engineering works refer to any kinds of construction works that may endanger or is likely to affect the structural integrity of the DMRTS structures and the safety of its operation, any

NOC for execution of Engineering Works shall only be processed on case-to-case basis. No engineering work shall commence on site without the permission of the Authority in writing. An application for NOC to commence a specific phase of engineering works shall be submitted by the consultant appointed for supervision and accompanied by the following items:

- (i) Plan for engineering works;
- (ii) Engineering evaluation report;
- (iii) Instrumentation proposal and initial instrumentation readings;
- (iv) Detailed construction procedure for all the relevant activities
- (v) Undertaking for crane operation (annexure A8) alongwith the site set up of crane which includes its positioning, circulation, maximum height and radius etc;
- (vi) Emergency procedure;
- (vii) Pre-condition survey report;
- (viii) Certified survey plan (if not submitted at Development Proposal stage);
- (ix) Relevant documents indicating planning approval from the competent authority.

(2) Plan for Engineering Works

The Plan for engineering works shall be prepared in accordance with the requirements of these Regulations and endorsed by the consultant.

(3) Details of Submittal Drawings

The layout plans and cross sectional details shall indicate the following items :

- (i) Scale of the plans;
- (ii) Building and boundary lines of building;
- (iii) Vertical and horizontal distances of the engineering works (site preparation, substructures and building construction works, etc.) in relation to the existing DMRTS structures; and
- (iv) First and second reserve lines of the DMRTS structures and the line of influence, where applicable.

(4) Engineering Evaluation Report

The Engineering evaluation report shall be prepared and endorsed by the consultant. The report shall address the following items:

- (i) Predicted movements at various stages of construction and at completion of the development works of the existing DMRTS structures due to the proposed engineering works.

The evaluation shall include the following items:

- Detailed examination of the ground conditions at site;
 - Calculations for the derivations of the predicted movements; and
 - Appropriate sensitivity analysis to check that the assessment would not be affected by any variation in input parameters and conditions that may occur during all stages of the construction work.
- (ii) Assessment of the likely effects of movement on the existing rapid transit systems. The effects on structural integrity, track beds, structural gauge clearances, drainage of the existing rapid transit systems, etc. shall be considered.
 - (iii) Proposal for any special measures or advance works needed to minimise the susceptibility of the existing DMRTS to damage and to ensure the continuation of safe train operating conditions.
 - (iv) Proposal for rectification works to the existing DMRTS structures. These may include specifications for remedial grouting or structural repair, requirements to adjust the track during or subsequent to construction, the need to re-align the affected drains, etc.

- (v) The report shall clearly demonstrate that the performance requirements established in Chapter 1 of this code are fully met after all works have been completed.

Notwithstanding the above, the Authority reserves the right to specify any other requirements on the engineering evaluation report which are deemed necessary for the safeguarding of the rapid transit systems.

(5) Instrumentation Proposal

The Instrumentation proposal for the Engineering Works shall be prepared and endorsed by the consultant. The proposal shall include the following items:

- (vi) Comprehensive monitoring system to monitor the behaviour of the existing DMRTS and the ground adjacent to it;
- (vii) Layout plans and relevant cross-sections indicating the locations of proposed instruments relative to the DMRTS structures;
- (viii) Details of the instruments or equipment, including types, function etc.;
- (ix) Frequency of monitoring;
- (x) Alarm levels where limits of movement are approached;
- (xi) Valid calibration certificates for the instruments proposed, where applicable; and
- (xii) Schedule for instrument installation works within the premises of rapid transit system structures indicating the number and frequency of access required.

If the above proposal is approved after due deliberation by the Competent Authority, a copy of the initial readings endorsed by the consultant shall be required to be submitted to DMRC for the release of NOC to commence work.

(6) NOC to Proposal for Engineering Works

In view of the sensitive nature of the Engineering works, DMRC shall be ascertaining the sufficiency and relevancy of the proposal submitted for the NOC prior to issuing any such certifications. The NOC if provided shall be subject to, the continual strict adherence of the following:

- (i) Approved construction procedure of Work
- (ii) Approved Instrumentation Method
- (iii) Approved Engineering Work Proposal
- (iv) Terms & Conditions of NOC
- (v) Other instructions issued by DMRC in real time during the execution phase to safeguard its structure.

It is conveyed that although all efforts shall be made out to accommodate the proposal however the issuance of NOC for an Engineering Work is solely the discretion of the Competent Authority of DMRC.

19. Submittals For NOC To Hoisting Of Crane/Mobile Or Any Type Of Tower

This section stipulates the procedures and requirements for obtaining NOC for hoisting of crane/mobile tower in the influence zone of DMRTS.

- (1) While applying for the approval of erection of crane/other types of mobile equipment, proposal shall be accompanied by the following items:
 - (i) Site set up of crane in DMRTS influence zone;
 - (ii) Maximum operational parameters of crane/mobile equipment including maximum radius and maximum boom height; and
 - (iii) Crane fitness documents
 - (iv) First and second reserve lines of the DMRTS structures and the line of influence, where applicable
 - (v) Crane operator competency certificate duly endorsed by PE.

- (vi) Drawing clearly showing the falling arch of boom in case of crane/mobile equipment failure.
- (2) While applying for the approval of erection of towers (telecom/others), proposal shall be accompanied by the following items:
- (i) Site set up of the tower in DMRTS influence zone;
 - (ii) First and second reserve lines of the DMRTS structures and the line of influence, where applicable
 - (iii) Detailed procedure for all the relevant activities in erection of mobile tower.
 - (iv) Drawing clearly showing the falling arch of tower.
- (3) NOC to Proposal for hoisting of erection of cranes and other types of mobile equipment/cellular towers
The Authority will approve the proposal in writing if the following requirements are complied with:
- (i) The consultant has complied with the requirements of Section 19 of this code and that all items submitted are found to be in order; and
 - (ii) The consultant has demonstrated and confirmed that it is feasible for the erection to fully meet the technical requirements of Section 21.
20. **Submittals For NOC To Erection Of Billboards/ Advertisement Hoardings Etc**
This section stipulates the procedures and requirements for obtaining NOC for erection of billboards/advertisement hoardings etc. in the influence zone of DMRTS.
- (1) While applying for the approval of erecting of billboards and advertisement hoardings, the proposal shall be accompanied by the following items:
- (i) Site set up of billboards in DMRTS influence zone;
 - (ii) Maximum height of billboards
 - (iii) Billboards material specification
 - (iv) Design document of supporting arrangement of billboards
 - (v) Detailed procedure for erecting and dismantling of billboards
 - (vi) First and second reserve lines of the DMRTS structures and the line of influence, where applicable
 - (vii) Drawing clearly showing the falling arch of tower.
- (2) NOC to Proposal for erection of billboards/advertisement hoardings etc.
The Authority will approve the erection of billboards/advertisement hoardings proposal in writing if the following requirements are complied with:
- (i) The consultant has complied with the requirements of Section 20 of this code and that all items submitted are found to be in order; and
 - (ii) The consultant has demonstrated and confirmed that it is feasible for the erection of billboards/advertisement hoardings to fully meet the technical requirements of Section 21.
21. **Deemed-To-Satisfy Provisions**
All works undertaken in the DMRTS influence zone shall meet the technical requirements termed as 'deemed to satisfy provision' contained in this section. All the proposals submitted, shall comply with the deemed to satisfy provisions mentioned in this section.
The Deemed-to-Satisfy Provisions for NOC in DMRTS Influence Zone are stated as follows:

- (1) Distance Criteria For Any Construction
The design and construction of development and buildings works in the DMRTS Influence Zone shall satisfy the following conditions as given below in table 1, 2 and 3.

Table 1.

Type of DMRTS structures (proposed)		Any Construction Activity	
		<u>In 1st reserve</u>	<u>In 2nd reserve</u>
Underground & Transition	Bored Tunnel	Not allowed	Allowed with restrictions
	Cut & Cover tunnel and station		
Elevated	Viaduct	Not allowed	Allowed with restrictions
	Station		

Table 2.

Type of DMRTS structures (under operation)		New Construction Activity on Vacant Land	
		<u>In 1st reserve</u>	<u>In 2nd reserve</u>
Underground & Transition	Bored Tunnel	Not Allowed	Allowed with restrictions
	Cut & Cover tunnel and station		
Elevated	Viaduct	Not allowed	Allowed with restrictions
	Station		

Table 3.

Type of DMRTS structures: (under operation)		Construction Activity due to Addition/Alteration to existing building	
		In 1 st reserve	In 2 nd reserve
Underground & Transition	Bored Tunnel	Not allowed	Allowed with restrictions
	Cut & Cover tunnel and station		
Elevated	Viaduct	Not allowed	Allowed with restrictions
	Station		

(2) Vibration Limits On Structures

The peak particle velocities at any DMRTS structure resulting from any construction activities like demolition work, piling works, excavation works etc which can induce vibrations shall not exceed 15mm/sec. Vibration monitoring during construction period may be submitted to DMRC once in a month.

(3) Monitoring Dmrts Structures

DMRTS structures and the adjacent ground shall be closely monitored during the construction stage of the engineering works. This may include monitoring track and lining within bored tunnels.

(4) Footings And Rafts

The design and layout of the footings and rafts should not interfere in maintenance of the viaduct including bearing replacement.

(5) Piling Works

Piling works including the construction of foundation piles, temporary or permanent earth retaining walls and any other drilling works in DMRTS influence zone shall be governed by Table-4.

Table 4. PILING WORKS & DIAPHRAGM WALLING

Type of DMRTS construction		First Reserve	Outside First Reserve
			Second Reserve
Underground	Clearance	Not Allowed	Allowed if piles are kept at least 6m or 1D* (whichever is greater) clear on plan from the exterior edge of rapid transit system structures *D=Outer dia. Of tunnel

	Method of Installation	Not Applicable	(a) Piles shall be generally be constructed by augering or reverse circulation drilling techniques. (b) Stability of the ground shall be ensured by the use of casings and /or drilling mud as appropriate. (c) Use of percussively driven concrete piles, steel H-piles, sheet piles or tandalised timber piles is not acceptable. (d) Use of rock chopping chisels is prohibited. (e) Use of vibratory method of installing and extracting sheet piles, H-piles or casing is prohibited.
At Grade	Clearance	Not Allowed.	Allowed.
	Method of Installation	Not Applicable	(a) Use of percussively driven concrete piles, steel H-piles, sheet piles or tandalised timber piles is not acceptable. (b) Use of drilling fluid in the drilling of piles shall be carefully controlled to prevent an increase in the piezometric head in the railway protection zone.
Above Ground	Clearance	Not Allowed.	Allowed

(6) Excavation Works

Excavation works in the railway protection zone shall satisfy the conditions of Table 5 of this section.

Table 5 EXCAVATION WORKS

	First Reserve	Outside First Reserve
Underground or transition	Not allowed	<p>Allowed subject to :</p> <p>(a) Piézometric Pressure in Compressible Soil</p> <p>The piezometric pressure in compressible soils within the first and second reserves shall not be reduced by more than 10kPa. Where the rapid transit system structures are supported on piles or other foundations extending below the compressible layer, this clause may be waived.</p> <p>(b) Cut-off Wall</p>

		<p>No trench, excavation, caisson, pile or well deeper than 1m below the existing ground water level shall be allowed unless suitable measures such as installation of cut-off wall, excavation under stabilizing fluid or mud, etc. are taken to control the reduction of piezometric pressure.</p> <p>(c) The stability of the rapid transit system structures adjacent to/ below the excavation shall be checked against the effect of buoyancy, uplifting, etc.</p> <p>(d) The design of temporary works for the excavation shall ensure adequate factor of safety against basal heave, hydraulic uplift of the base, toe-stability of retaining walls, material failure, strut failure, etc.</p>
At grade	Not allowed.	Same as above
Elevated	Not allowed.	Allowed subject to item (c) above if lowering of the ground water table is expected due to the excavations.

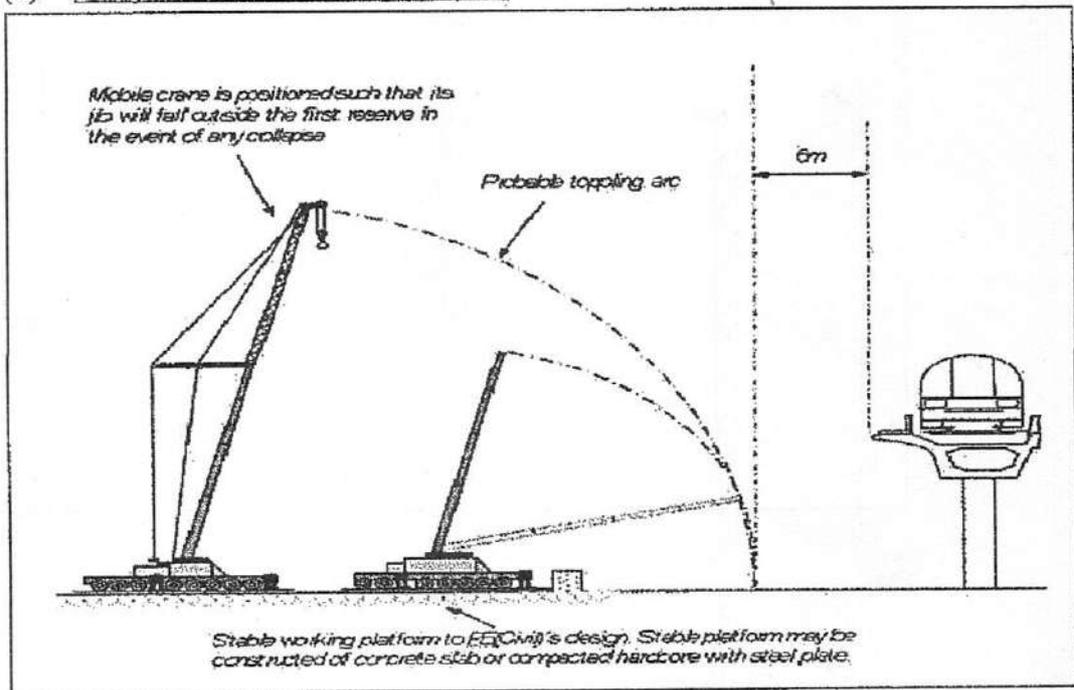
(7) Hoisting Of Mobile/Tower Crane Or Mobile Towers

(i) Risks in case of mobile crane/Plant

The risks posed by the movement and operation of cranes and mobile construction plants/telecom towers could include:-

- These equipment may topple and hit the railway structures and trains.
- Boom of equipment could slew and hit the railway structures and trains.
- Load lifted by crane may swing into the direction of passing trains.
- Materials being lifted could drop and strike the railway structures and train

(ii) Safety control in case of mobile crane



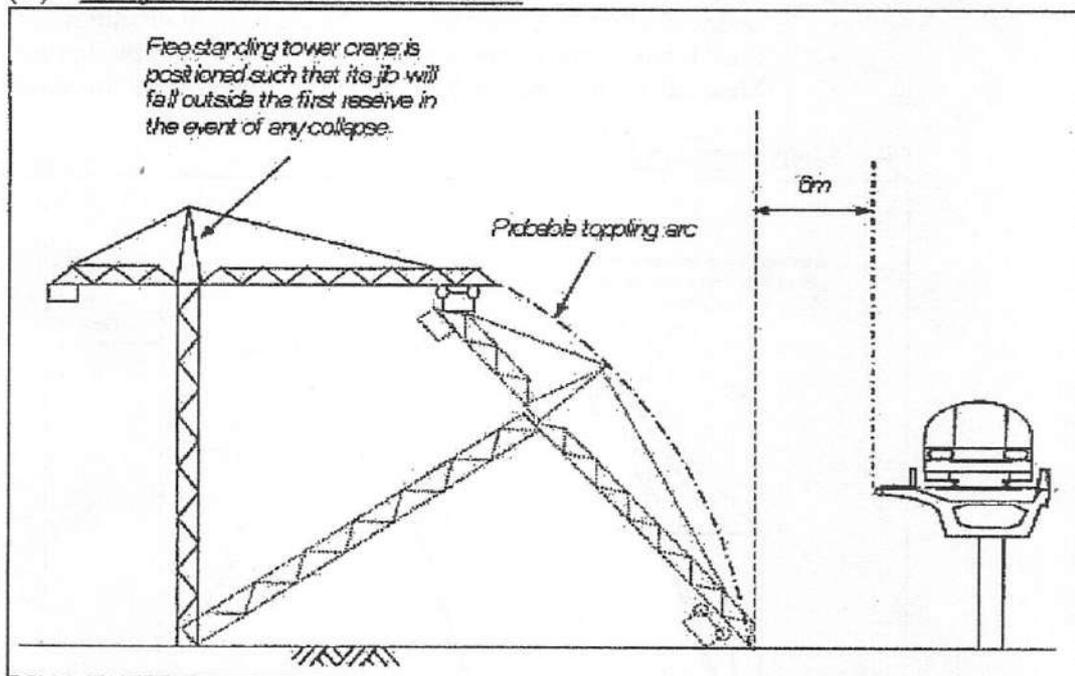
- The appropriate machine should be selected for the work.
- Lifting equipment must have valid certificates.
- Position the crane such that the boom and equipment must be designed, checked and endorsed by PE. This should include wind load.
- Lifting of materials/equipment must not be carried out in 1st reserve
- Access and working platform of crane and equipment must be designed, checked and endorsed by PE. This should include wind load.
- Outriggers or tracks of crane must be fully extended and supported on steel plates over firm ground.
- Crane shall park at a safe distance away from the metro at end of each day after use.
- Provide physical barrier /warning /restricted zone where the equipment and plant should not encroach.
- Install 1st reserve markers along boundary of site next to the DMRTS structures.
- Provide tag line and other measures to prevent load from swing to the DMRTS.

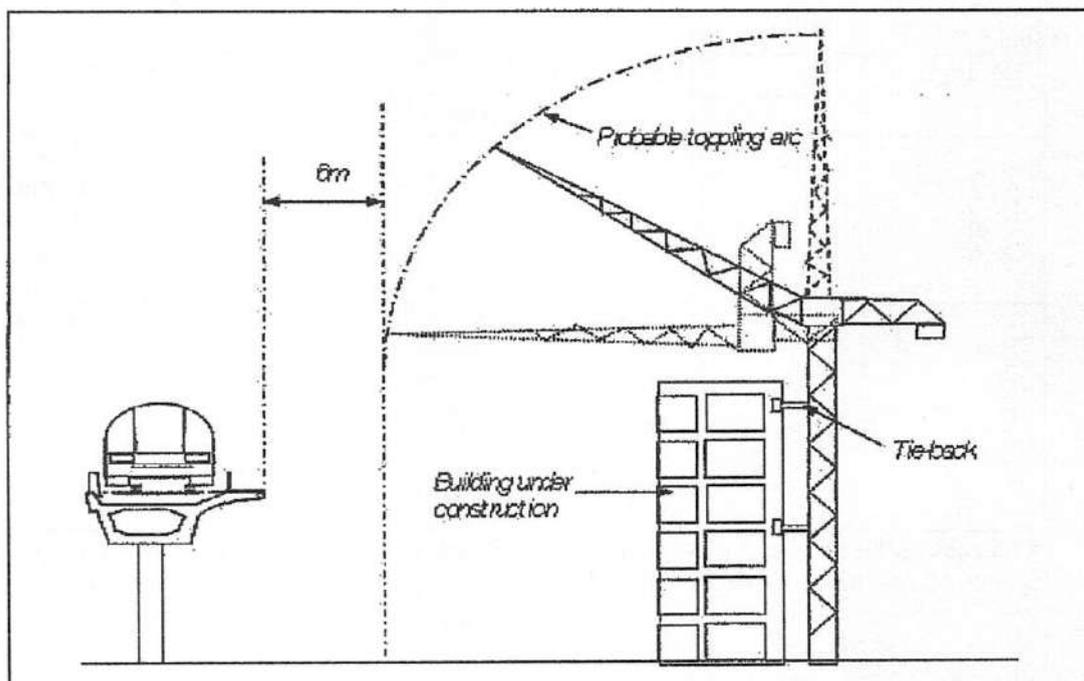
(iii) Risks in case of Tower Crane

The risks are similar to those of mobile crane.

- Part of tower crane or its load may fall on to elevated or at grade railway structure if it topples or if there is a mechanical fault.
- The mast of tower crane could collapse due to fatigue or structure failure.
- Foundation of tower crane not designed and installed properly.

(iv) Safety Control in case of Tower Crane





- Tower crane to be preferably positioned behind proposed building away from the railway.
- Foundation must be designed by a PE (Civil) and its construction supervised by the PE.
- Free standing tower crane must be positioned such that its jib will not topple into the 1st reserve.

Any works in the DMRTS Influence Zone shall meet the technical requirements contained in this chapter. Proposals that comply with the deemed-to-satisfy provisions of this section will be deemed to have satisfied the objectives and performance requirements stipulated in this code and shall be issued NOC accordingly.

(8) Plantation Of Plants And Trees

The plantation works in the influence zone of DMRTS shall be allowed along with the following restrictions as provided in Table 6.

Table 6 *

Description	FIRST RESERVE	SECOND RESERVE
	Within 1 st Reserve	
Elevated Viaduct	Not Allowed	Allowed with the condition that the trees with full-grown height must not extend more than 6m above the parapet or wing wall of the railway viaduct
Underground	Not Allowed	Allowed

* The above 'Deemed to Satisfy' Criterion is subject to the condition that the location of these plantations do not hamper the Performance Objectives (stated in Section 4(1)) of the DMRTS in any ways.

CHAPTER 5
GUIDELINES TO CARRY OUT RESTRICTED ACTIVITIES
WITHIN DMRTS INFLUENCE ZONES

22. Introduction

This section deals with general guidelines to carry out restricted activities within DMRC Railway Protection & Safety Zones. The safety considered required to be adhered while carrying out mobilization and demolition works in the DMRTS influence zone have also been elaborated. Acceptable practice of demarcating DMRTS reserve lines on site, method of carrying out mobilization works, demolition works etc., are explained with photographs taken from development sites.

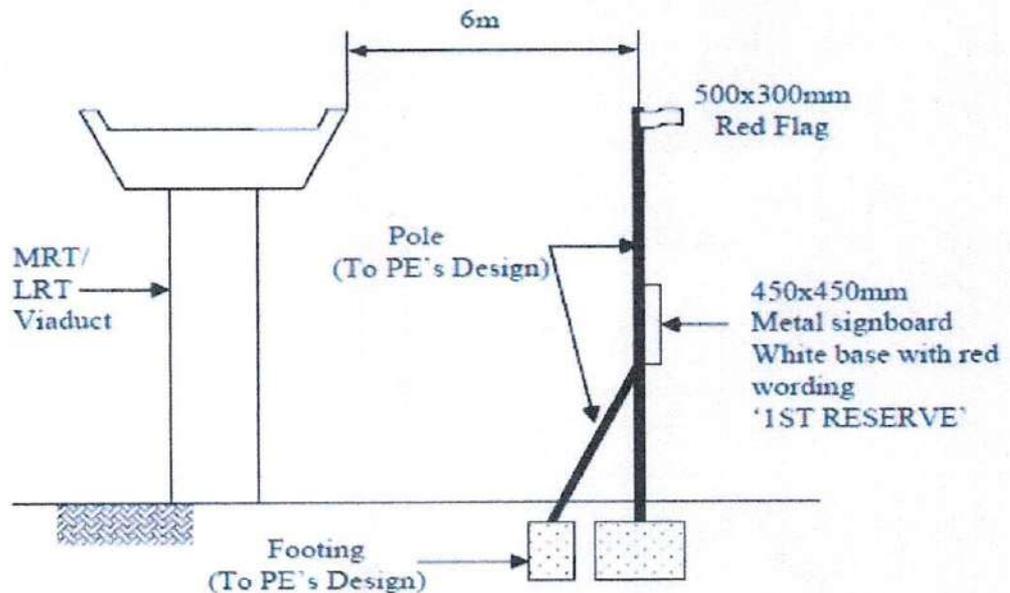
23. Mobilization Works

(1) Demarcation of reserve lines

All DMRTS reserve lines must be pegged and demarcated clearly on site by a registered land surveyor based on an approved certified survey plan.

Above ground DMRTS structures

No demarcation markers should be erected higher than the viaduct beam level as they may fall onto the viaduct in the event of any collapse.



Note: Demarcation poles must not be spaced at more than 15m interval

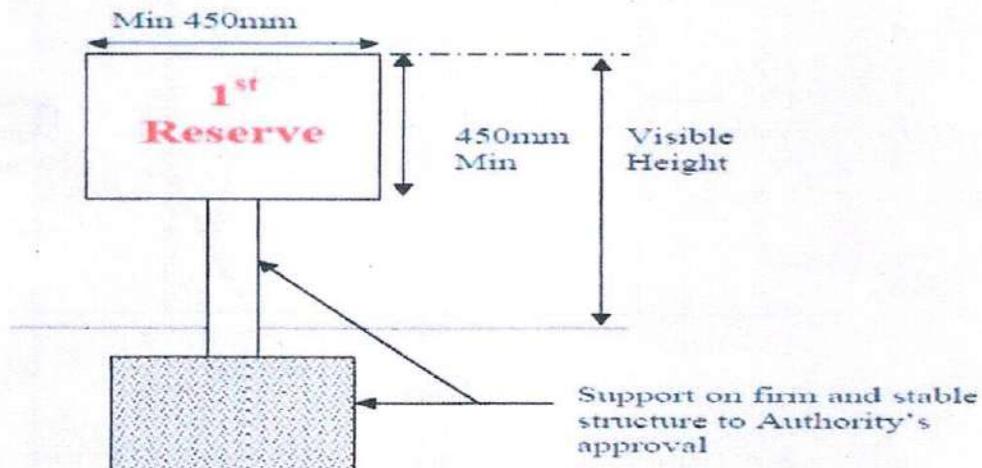


Underground DMRTS structures

Before work commences, the exact location of the DMRTS structures and the 1st reserve line must be properly demarcated at site.

- Drilling work to be approved to ensure no possibility of drilling into the underground DMRTS structure.
- Load bearing piles falling within the zone of influence are debonded or alternatively checked to prevent imposing additional load on the tunnel lining.

The 1st and 2nd reserves of underground DMRTS structure must be displayed on site at all times during the construction period.



Note: All materials to be non-combustible unless approved by Authority.

Storage of materials

Site activities involving any storage or placement of construction materials, temporary storage of flammable fluid, gas cylinders etc. are not allowed within 1st reserve of any DMRTS structure.

The main safety concerns relating to the storage or placement of materials near the DMRTS structures are as follows:

- Fire hazard to the above ground DMRTS structures.
- Combustible material on fire may cause smoke and fumes to enter the underground station (through vent shaft or station entrance).
- Additional stress onto the underground DMRTS structures should not exceed the allowable limits as approved by DMRC.

Erection of temporary structures

- Materials used for the erection of any temporary structure located within the 1st reserve are to be non-combustible to prevent a fire hazard.



- No fire risk activities are to be carried out within any temporary structure located within the 1st reserve.
- Scaffolding is to be designed such that it is stable, robust and suitably tied back to prevent any collapse onto the above ground DMRTS structure.
- Fire-Proof nets or other suitable screens to be provided to prevent any debris, tools etc from falling onto the tracks.

Temporary structures such as hoarding, passageway etc. erected next to/within metro station and its entrances are subjected to the following measures:

- Provide fire compartment to work area.
- Maintain clear minimum width for fire escape in station and access for fire tender.

- Ensure safe protected passageway in and out of metro station.
- The structures must not interfere with the free flow of air into and out of the metro ventilation shafts.
- Provide sufficient ventilation facilities in passageway.
- Must not affect the existing fire safety and fire protection system.
- Provide adequate directional signages and lighting to passageway.

Access under viaduct

To prevent high vehicles from hitting the viaduct beam, all access under the viaduct must be provided with temporary height restriction gantries on both sides of the viaduct. Reflective paint is to be provided on the steel structure to enhance visibility.



24. Demolition works

Demolition of buildings is acceptable in all reserves. The contractor must not stockpile the debris within the influence zone of DMRTS structure. He is responsible to clear the debris as soon as possible such that the allowable surcharge load on the DMRTS structures will not be exceeded.

(1) Method of demolishing buildings

Vibration to the DMRTS structures arising from any demolition works must not exceed 15mm/sec (peak particle velocity).

Acceptable methods of work are:

- Use of a hand-held breaker.
- Use of a crusher

- Provision of a cushion to the ground with energy absorbing material to reduce the impact on the ground from demolition rubble when demolishing a building.

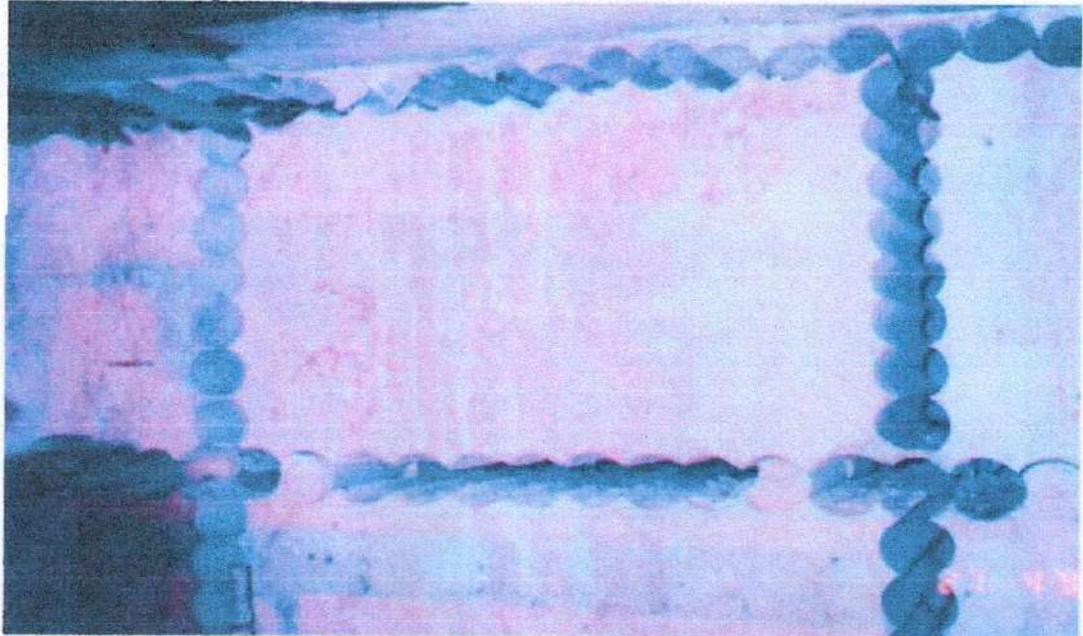
Method of demolition must take into consideration the risk of equipment toppling onto the above ground DMRTS structure.

(2) Method of demolishing (modifying) adjoining station structures

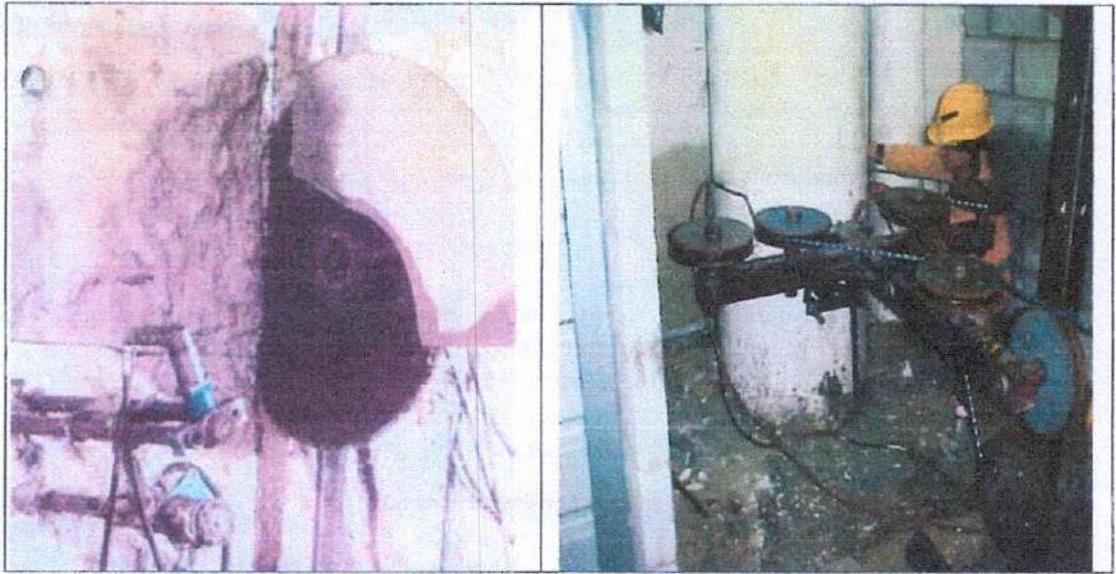
- Minimise the vibration induced on the station structure (not exceeding 15mm/sec peak particle velocity).
- Minimise the generation of dust and noise disturbance or inconvenience to the commuters during train operation hours.
- Maintain the flood protection level of the stations

Acceptable demolition methods include:

- Stitch coring



- Use of a diamond cutter, diamond wire saw.



- Use of a hydro-jet



- Monitoring of vibration levels
During the period of demolition, vibration levels on the nearby DMRTS structure are to be closely monitored. This can be done by installing vibration sensors on the DMRTS structure to provide a continuous monitoring of the vibration levels.

25. Sub Structure Works

(1) Piling and drilling works

- i. Clearance from DMRTS
Piling works are not allowed within the 1st reserve for all types of DMRTS structures.
- ii. Construction method
Pile installation must not cause ground movement, displacement or vibration at the DMRTS structures, exceeding the Code limits.

The stability of the bored holes within the DMRTS influence zone of an underground DMRTS structure should always be assured by suitable methods such as the use of casing or drilling mud (stability checks are required) to prevent collapse of bored holes, as appropriate.

Pile installation methods within the DMRTS influence zone that minimize the effect of vibration at the underground or transition DMRTS structures are:

- Augering or reverse circulation drilling techniques



- Oscillatory method



Methods of pile installation that are likely to generate excessive vibration are not acceptable within the 2nd reserve of DMRTS structures.

- Use of down-the-hole drilling technique



- Use of percussively driven concrete piles, steel H-piles, sheet-piles or timber piles etc.
- Use of rock chopping chisels
- Use of vibratory method of installing or extracting sheet piles, H-piles or steel casings.

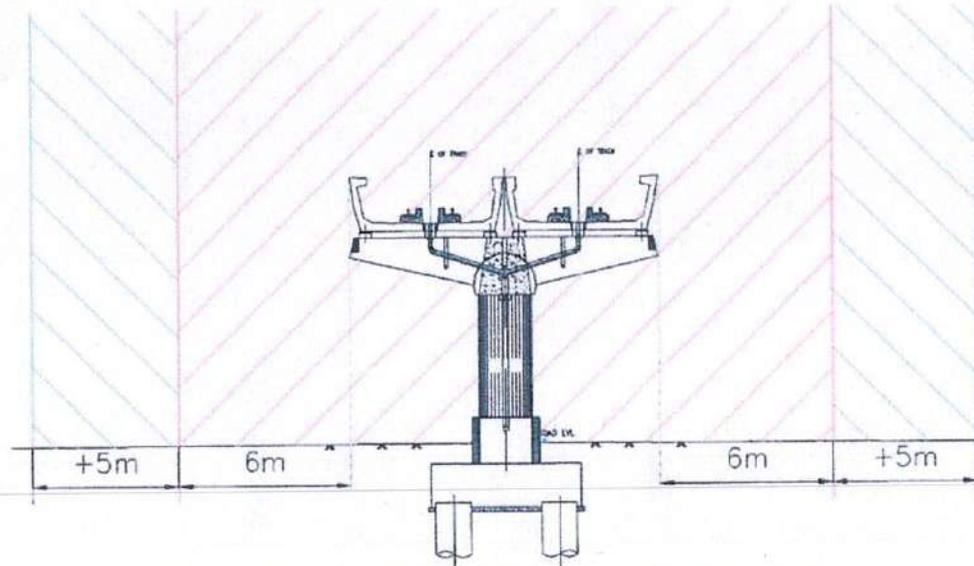


Automatic and continuous monitoring of vibration levels at the nearest DMRTS structure should be provided during the installation of piles within DMRTS influence zone.

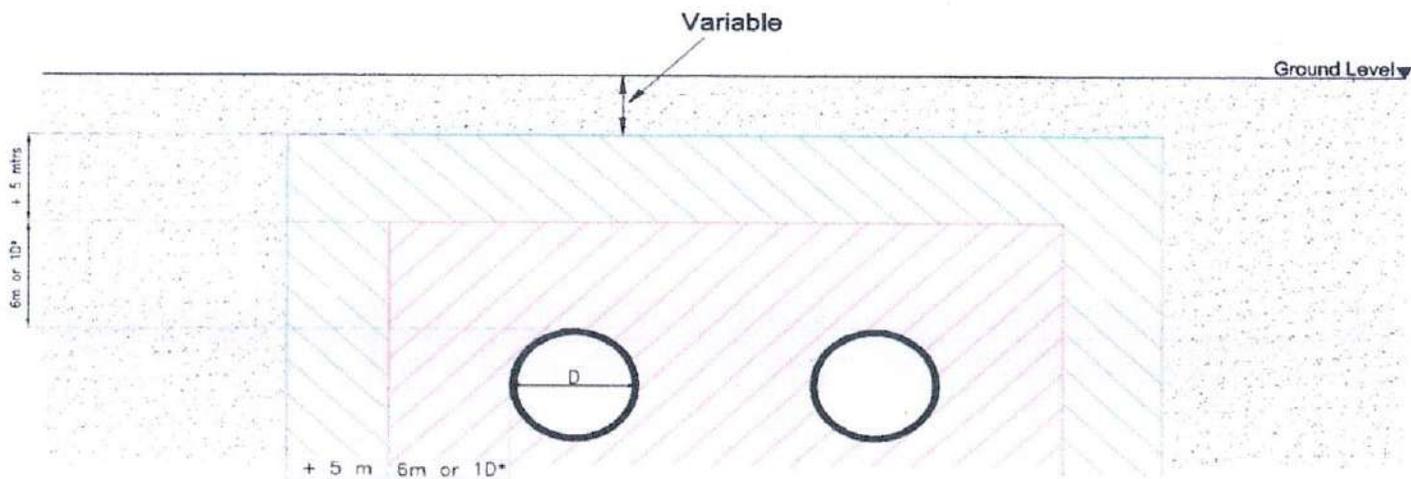
ANNEXURES

Annexure-A1

Legends	
	1st Reserve Line
	2nd Reserve Line
	1st Reserve
	2nd Reserve

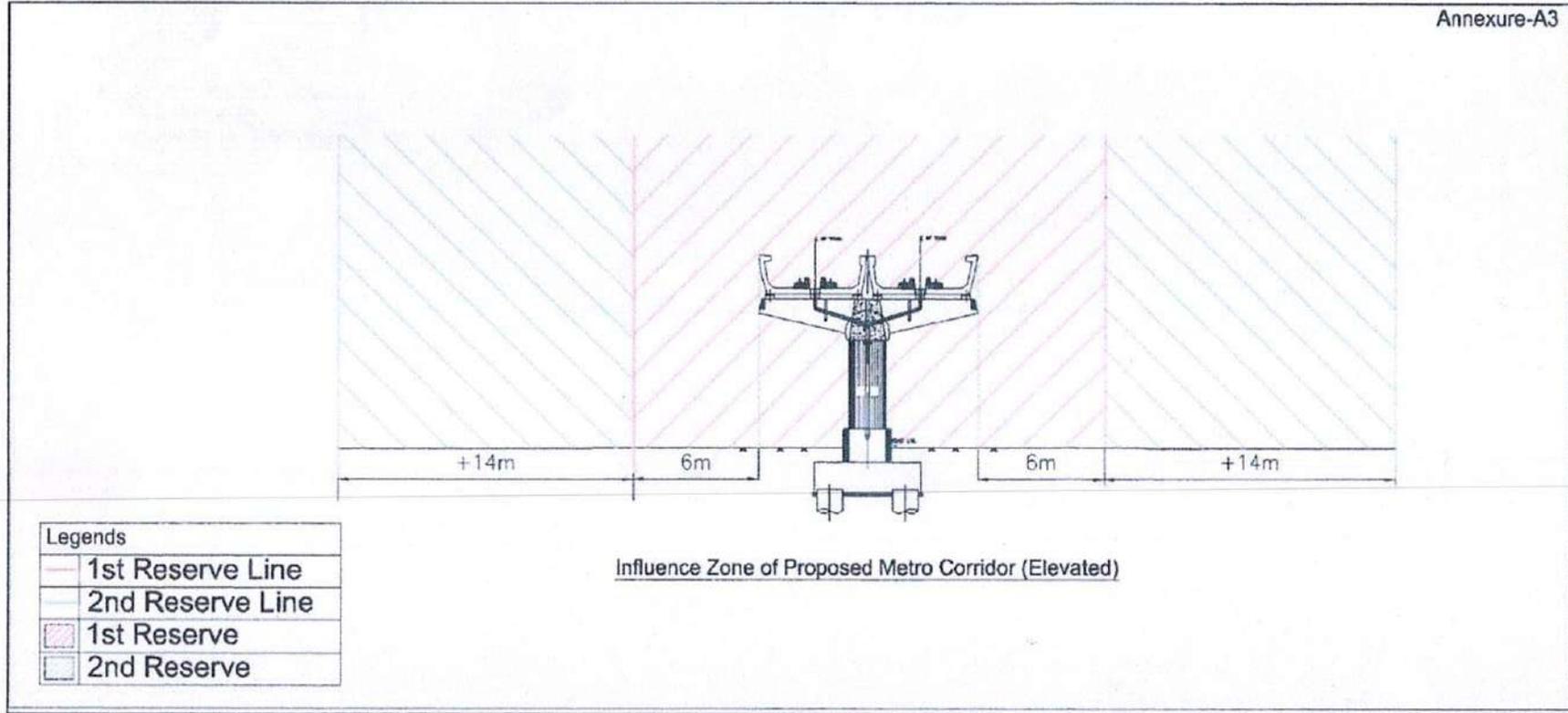


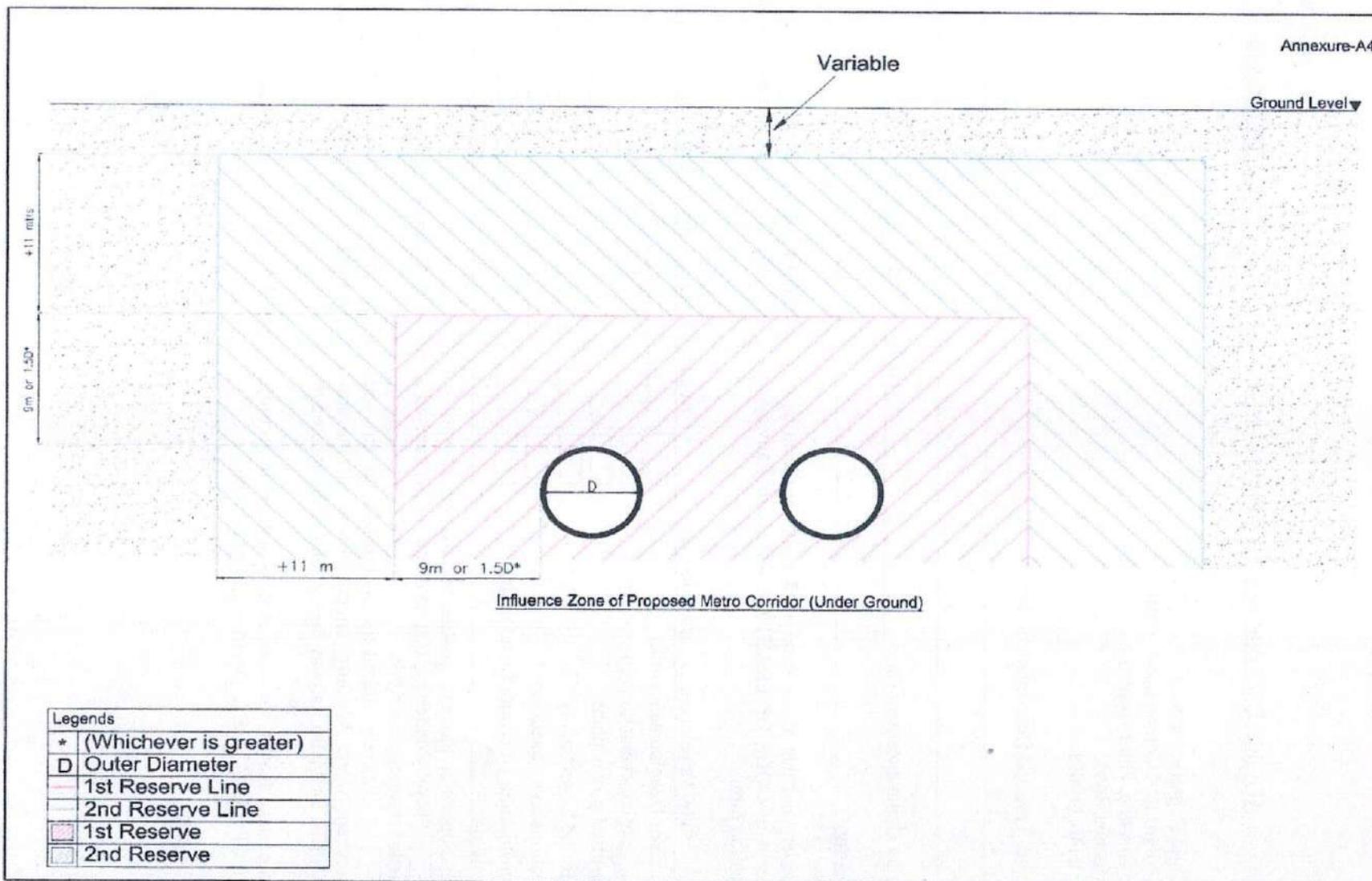
Influence Zone of Existing Metro Corridor (Elevated)



Influence Zone of Existing Metro Corridor (Under Ground)

Legends	
*	(Whichever is greater)
D	Outer Diameter
	1st Reserve Line
	2nd Reserve Line
	1st Reserve
	2nd Reserve





APPLICATION FOR DEVELOPEMENT WORKS IN DMRTS INFLUENCE ZONE

To,
 The Chief Engineer/General
 Delhi Metro Rail Corporation Limited
 Metro Bhawan, Fire Brigade Lane,
 Barakhamba Road,
 New Delhi- 110001

1. Project Title and Description of Works:

2. Target Commencement Date: _____ Completion Date: _____

3. Location: _____

4. I understand that above mentioned works needs to be carried within the DMRTS influence zone. As per chapter 4 of CODE OF PRACTICE for Metro Railway Protection, following is being submitted with this application form.

Submission by Developers as per section 16	Remarks by Delhi Metro Rail Corporation
(a) Plan For Development works	<input type="checkbox"/> _____
(b) Engineering evaluation report by PE	<input type="checkbox"/> _____
(c) Certified survey plans	<input type="checkbox"/> _____
(d) Site and Layout plans	<input type="checkbox"/> _____
(e) Sections and elevations	<input type="checkbox"/> _____
(f) Construction procedure for all relevant Activities	<input type="checkbox"/> _____

5. Crane operation during execution of development work

a) I hereby undertake that no crane will be deputed at site for execution of any activity related to above mentioned development work.

b) I hereby submit the undertaking for safe operation of crane required for the above mentioned development work. We also undertake that all the conditions mentioned in section 19 of CODE OF PRACTICE for Metro Railway Protection will be adhered on site.

6. I undertake that all the work shall be carried in accordance with the guidelines mentioned in chapter 5 of CODE OF PRACTICE for Metro Railway Protection.

7. I undertake that no work shall start on site unless written clearance for commencement of work is obtained from Delhi Metro Rail Corporation.

Name of Project In charge/Developer:

Name of Developer/Company:

Address:

Signature:

Contact No.:

Date:

Fax.:

FOR OFFICIAL USE ONLY

We have in principle no objection to your proposal. You are allowed to commence works on site. Your works shall comply with the CODE OF PRACTICE for Metro Railway Protection. Before commencement of work clearly demarcate reserve lines on site.

The proposal falls outside the DMRTS influence zone. Clearance is not required.

Please comply the remarks mentioned above against item no. 4 ().

Please contact _____ for any queries.

For Chief Engineer/ General
(Delhi Metro Rail Corporation)

Date:
Place:

APPLICATION FOR BUILDING WORKS IN DMRTS INFLUENCE ZONE

To,
The Chief Engineer/General
Delhi Metro Rail Corporation Limited
Metro Bhawan, Fire Brigade Lane,
Barakhamba Road,
New Delhi- 110001

1. Project Title and Description of Works:

2. Target Commencement Date: _____ Completion Date: _____

3. Location: _____

4. I understand that above mentioned works needs to be carried within the DMRTS influence zone. As per chapter 4 of CODE OF PRACTICE for Metro Railway Protection, following is being submitted with this application form.

Submission by Developers as per section 17	Remarks by Delhi Metro Rail Corporation
(a) Plan For Building works	<input type="checkbox"/>
(b) Engineering evaluation report by PE	<input type="checkbox"/>
(c) Drainage Department Clearance	<input type="checkbox"/>
(d) Site and Layout plans.	<input type="checkbox"/>
(e) Sections and elevations	<input type="checkbox"/>
(f) Construction procedure for all relevant activities	<input type="checkbox"/>

5. Crane operation during execution of building work

a) I hereby undertake that no crane will be deputed at site for execution of any activity related to above mentioned building work.

b) I hereby submit the undertaking for safe operation of crane required for the above mentioned building work. We also undertake that all the conditions mentioned in section 19 of CODE OF PRACTICE for Metro Railway Protection will be adhered on site.

6. I undertake that all the work shall be carried in accordance with the guidelines mentioned in chapter 5 of CODE OF PRACTICE for Metro Railway Protection.

7. I undertake that no work shall start on site unless written clearance for commencement of work is obtained from Delhi Metro Rail Corporation.

Name of Project In charge/Developer:

Name of Developer/Company:

Address:

Signature:

Contact No.:

Date:

Fax:

FOR OFFICIAL USE ONLY

We have in principle no objection to your proposal. You are allowed to commence works on site. Your works shall comply with the CODE OF PRACTICE for Metro Railway Protection. Before commencement of work clearly demarcate reserve lines on site.

The proposal falls outside the DMRTS influence zone. Clearance is not required.

Please comply the remarks mentioned above against item no. 4 ().

Please contact _____ for any queries.

For Chief Engineer General
(Delhi Metro Rail Corporation)

Date:

Place:

APPLICATION FOR ENGINEERING WORKS IN DMRTS INFLUENCE ZONE

To,
 The Chief Engineer/General
 Delhi Metro Rail Corporation Limited
 Metro Bhawan, Fire Brigade Lane,
 Barakhamba Road,
 New Delhi- 110001

1. Project Title and Description of Works:

2. Target Commencement Date: _____ Completion Date: _____

3. Location: _____

4. I understand that above mentioned works needs to be carried within the DMRTS influence zone. As per chapter 4 of CODE OF PRACTICE for Metro Railway Protection, following is being submitted with this application form.

Submission by Developers as per section 18	Remarks by Delhi Metro Rail Corporation
a) Plan For Engineering works	<input type="checkbox"/>
b) Engineering evaluation report by PE	<input type="checkbox"/>
c) Instrumentation proposal with initial readings	<input type="checkbox"/>
d) Site and Layout plans	<input type="checkbox"/>
e) Sections and elevations	<input type="checkbox"/>
f) Construction procedure for all relevant Activities	<input type="checkbox"/>
g) Emergency procedure	<input type="checkbox"/>
h) Pre-condition survey report	<input type="checkbox"/>
i) Certified survey plan	<input type="checkbox"/>
j) Planning approval from the competent Authority	<input type="checkbox"/>

5. Crane operation during execution of engineering work

- a) I hereby undertake that no crane will be deputed at site for execution of any activity related to above mentioned engineering work.
- b) I hereby submit the undertaking for safe operation of crane required for the above mentioned engineering work. We also undertake that all the conditions mentioned in section 19 of CODE OF PRACTICE for Metro Railway Protection will be adhered on site.

6. I undertake that all the work shall be carried in accordance with the guidelines mentioned in chapter 5 of CODE OF PRACTICE for Metro Railway Protection.

7. I undertake that no work shall start on site unless written clearance for commencement of work is obtained from Delhi Metro Rail Corporation.

Name of Project In charge/Developer:

Name of Developer/Company:

Address:

.....

Signature:

Contact No.:

Date:

Fax.:

FOR OFFICAL USE ONLY

We have in principle no objection to your proposal. You are allowed to commence works on site. Your works shall comply with the CODE OF PRACTICE for Metro Railway Protection. Before commencement of work clearly demarcate reserve lines on site.

The proposal falls outside the DMRTS influence zone. Clearance is not required.

Please comply the remarks mentioned above against item no. 4 ();

Please contact _____ for any queries.

For Chief Engineer/General
(Delhi Metro Rail Corporation)

Date:

Place:

APPLICATION FOR CRANE OPERATION (MOBILE/TOWER) IN DMRTS INFLUENCE ZONE

To,
 The Chief Engineer/General
 Delhi Metro Rail Corporation Limited
 Metro Bhawan, Fire Brigade Lane,
 Barakhamba Road,
 New Delhi- 110001

1. Project Title and Description of Works:

2. Target Commencement Date: _____ Completion Date: _____

3. Location: _____

4. I understand that above mentioned works needs to be carried within the DMRTS influence zone. As per chapter 4 of CODE OF PRACTICE for Metro Railway Protection, following is being submitted with this application form.

Submission by Developers as per section 19	Remarks by Delhi Metro Rail Corporation
(a) Site set up of crane /tower <input type="checkbox"/>	_____
(b) Operational parameters of crane/mobile equipment <input type="checkbox"/>	_____
(c) Crane Fitness Documents <input type="checkbox"/>	_____
(d) Crane operator competency certificate <input type="checkbox"/>	_____
(e) Drawing of falling arch of boom/tower <input type="checkbox"/>	_____
(f) Procedure for all relevant activities <input type="checkbox"/>	_____
(g) 1 st & 2 nd Reserve lines of DMRTS structures <input type="checkbox"/>	_____

5. I undertake that all the work shall be carried in accordance with the guidelines mentioned in chapter 5 of CODE OF PRACTICE for Metro Railway Protection.

6. I undertake that no work shall start on site unless written clearance for commencement of work is obtained from Delhi Metro Rail Corporation.

Name of Project In charge/Developer:

Name of Developer/Company:

Address:

.....

Signature:
 Date:

Contact No.:
 Fax.:

FOR OFFICIAL USE ONLY

- We have in principle no objection to your proposal. You are allowed to commence works on site. Your works shall comply with the CODE OF PRACTICE for Metro Railway Protection. Before commencement of work clearly demarcate reserve lines on site.
- The proposal falls outside the DMRTS influence zone. Clearance is not required.
- Please comply the remarks mentioned above against item no. 4 ().
- Please contact _____ for any queries.

For Chief Engineer General
(Delhi Metro Rail Corporation)

Date:
Place:

APPLICATION FOR ERECTION OF BILLBOARDS/ADVERTISING HOARDINGS IN DMRTS
INFLUENCE ZONE

To,
The Chief Engineer/General
Delhi Metro Rail Corporation Limited
Metro Bhawan, Fire Brigade Lane,
Barakhamba Road,
New Delhi- 110001

1. Project Title and Description of Works:

2. Target Commencement Date: _____ Completion Date: _____

3. Location:

4. I understand that above mentioned works needs to be carried within the DMRTS influence zone. As per chapter 4 of CODE OF PRACTICE for Metro Railway Protection, following is being submitted with this application form.

Submission by Developers as per section 20	Remarks by Delhi Metro Rail Corporation
a) Site set up of Billboards/Hoardings <input type="checkbox"/>	_____
b) Maximum height of Billboards/Hoardings <input type="checkbox"/>	_____
c) Materials Specification <input type="checkbox"/>	_____
d) Design documents of supporting arrangement <input type="checkbox"/>	_____
e) Procedure for all relevant activities <input type="checkbox"/>	_____
f) Drawing showing falling arch of tower <input type="checkbox"/>	_____
g) 1 st & 2 nd Reserve lines of DMRTS structures <input type="checkbox"/>	_____

5. I undertake that all the work shall be carried in accordance with the guidelines mentioned in chapter 5 of CODE OF PRACTICE for Metro Railway Protection.

6. I undertake that no work shall start on site unless written clearance for commencement of work is obtained from Delhi Metro Rail Corporation.

Name of Project In charge/Developer:

Name of Developer/Company:

Address:

Signature:

Contact No.:

Date:

Fax.:

FOR OFFICIAL USE ONLY

We have in principle no objection to your proposal. You are allowed to commence works on site. Your works shall comply with the CODE OF PRACTICE for Metro Railway Protection. Before commencement of work clearly demarcate reserve lines on site.

The proposal falls outside the DMRTS influence zone. Clearance is not required.

Please comply the remarks mentioned above against item no. 4 ().

Please contact _____ for any queries.

For Chief Engineer General
(Delhi Metro Rail Corporation)

Date:
Place:

Sequence Flow Chart for Accordance of NOC

